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The Copper Situation

Of the American industries which have suffered a direct and serious check because of the conflict in Europe, the copper industry has been hit the hardest. Production, which had already been curtailed to some extent owing to financial depression and to labor troubles, has now been cut in two owing to the war. This is not to be wondered at when it is considered that less than half of the copper produced in this country is used for domestic consumption. To be sure, there has been a tendency in recent years toward overproduction so that the present crisis is not without compensation in that it will tend to place copper on a more stable basis. On the other hand, some producers look upon the situation with alarm because it represents an actual loss in cash. Germany consumed 145,500 tons of American copper last year, Holland took 77,100 tons, France 65,800 tons, and England 55,600 tons. The price ranged from 16 cents to 15 cents a pound, depending on the grade, and inasmuch as no less than 395,000 tons of copper were exported last year, some comprehension of the loss in dollars and cents is afforded. Shutting down mines under such conditions is both logical and wise. The market undoubtedly will still be open to the United States when conditions in Europe return to normal, but it will take some time for the copper industry to recover from the loss the present European war entails.

Credits in South America

Many people have spoken and written about the need of granting long-time credits to South American buyers of electrical apparatus. Manufacturers have been cautioned that the South American buyer regards payment in three or four months as equivalent to cash. Carry the argument a little further, and it appears that a long-time payment, as that is known ordinarily in this country, would be postponed in South America to a month far distant on the calendar. This condition arises in part from a lack of capital, and it is strengthened by the lifetime practices of our neighbors on the south. Whatever terms are essential for our manufacturers to make they will make. In the past they have felt that they were handicapped by a lack of knowledge of South American customs, lack of banks and lack of American shipping facilities. In reality these obstacles seemed more serious than they were. Knowledge can be acquired, the National City Bank of New York is to start branches, and American shipping facilities are already in a fair way to be provided. Foreign banks have always been open in South America, and shipping facilities under flags of other nations have been plentiful. Bankers and manufacturers know that the question of credit is like any other business problem. It is answered by the same reasonable rules that are applied to all business problems. If long-time credit is a factor in a sale, it is a factor in the cost. The expense of financing the account is a part of the expense of producing and financing the goods. If the buyer gets long-time credit, he is not on the same basis with the buyer who pays cash. If the credit involves undue risk of principal, that is another factor to be reckoned with in the calculation of cost. No new market can be entered easily or without advance preparation and expense. To these difficulties South American countries add the problems of different language and customs and of long-established relations with European business men. Like the question of credit these problems have a reasonable solution which it has now become the duty of manufacturers to discover.

Attention to Export Trade

This journal has been making an effort to see how far America can do its share in preserving intact and in keeping vitalized all the vast electrical applications in countries outside the scene of warfare that must have supplies and new material. Recent issues have had a number of articles and interviews devoted to the subject. The one fact that has been made clear is that the electrical export trade was utterly unprepared for war, and that export trade in general has not yet made more than the merest beginning in securing its necessary facilities. The electrical opportunities have been fairly well indicated, but there is still a lack of some focal point or central agency to which the miscellaneous incoming demand for goods and the outward push for customers might be directed. Our present electrical export trade of about $25,000,000 has been done by relatively few concerns and without concentrated and sustained effort beyond them and their connections abroad. They are a very small percentage numerically of the 1000 American electrical manufacturers for whose apparatus a demand may now be reasonably assumed to exist, not merely abroad but here at home, to fill the place of goods previously brought in from the Continent and England. It is not known that any such definite organized agency exists except the loosely knit National Foreign Trade Council. We are without any available electrical body, for none of the societies such as the American Institute of Electrical Engineers or the National Electric Light Association is intended or equipped for the work. Possibly the Society for Electrical Development might here discover a new oppor-

tunity, but its present basis is purely domestic. The formation of an export association, which was discussed in our issue of last week, would help manufacturers, and its possibilities merit careful consideration.

A Large Transmission System Service by Steam Plants

The system of the Texas Power & Light Company, which we describe in this issue, is rather notable as being one of the very few large transmission plants operated by steam power. Electric transmission has been so bound up with the development of the hydroelectric station that one almost instinctively associates the two together, so that it is of no little interest to realize that we have here in the largest state of the Union a network of nearly 250 miles of 60,000-volt transmission line fed from steam plants using the relatively cheap fuel produced in neighboring territory. The system is fed in fact from two such stations, one of which, at Fort Worth, was described in our last issue, the other being at Waco at the southernmost end of the transmission district. The main transmission line is of steel-tower construction with towers spaced at intervals of about 600 ft. and carrying the conductors at an elevation of about 50 ft. above the ground. A single line operating at the same voltage on the eastern edge of the district is carried on wood poles. These are 55 ft. in height and are spaced at 300-ft. intervals. They carry, however, only a single three-phase circuit of No. 1 wire. Suspension insulators are employed throughout the system, and usually consist of four disks in series.

A particularly interesting feature of the plant is the fact that all the transformers and switching substations are of the outdoor form, and the high-tension switches themselves are mostly of the air-break type used so extensively on the Pacific Coast, although less familiar to operating men in Eastern communities. A certain number of oil switches are placed at important points, but most of the duty of transferring connections falls upon the simpler air-break apparatus. Some thirty-three separate communities are served by the system. In the cases of some of the smaller towns the outdoor substations have no regular attendants, arrangements being made with some local call man to visit the station daily as well as when specially summoned to make any changes in the connections required. On his regular visit this part-time attendant charges the aluminum-cell lightning arresters, where these are used, looks after the oil levels and transformers, reads the instruments, and sends a daily record of all the details to the superintendent of power. Indeed striking is the fact that it has proved possible to make the system so nearly automatic in its regular functioning that these daily visitations are effective from an operative standpoint. At all the substations the motor and lighting circuits are kept separate and the latter are all provided with automatic induction regulators. It will thus be seen that in so far as is possible the whole transmission system is arranged to take care of itself without an extraordinary degree of attention. The separation of the lighting and motor circuits is a rather important feature of the general scheme, particularly since the company carries a heavy motor load, furnishing service to many cotton gins, cottonseed-oil mills, flour mills and other large consumers. The whole system is a type of that class of development which is necessary in dealing with a large load in comparatively widely separated communities scattered over a wide area, and is all the more notable as proving that a difficult problem of this kind can be economically worked out while deriving energy entirely from steam plants.

Transatlantic Radio Service

The difficulties of securing regular and uniform wireless communication increase so rapidly as the separation of the sending and receiving stations becomes greater that at the present time few, if any, pairs of installations are working constantly across more than 2000 miles of land or sea. In the early days of long-distance radio signaling the greatest trouble seemed to be from the tremendous decrease in signal strength in daylight as compared to that of night signals. This bugbear was almost entirely removed by the adoption of wave-lengths of 4000 meters or more. Then there remained the impossibility of reading weak signals when atmospheric disturbances were intense, and it was not until after the general adoption of the high-frequency musical spark transmitter that this hardship was sufficiently reduced to permit regular transmission over even 1000 miles. The long-distance working of the Arlington naval station, of Glace Bay and Clifden, and of the Nauen and Sayville plants, has shown that by spark telegraphy distances of about 2000 miles may be covered in a fairly dependable manner, provided that use is made of long waves, high group frequencies and abundant transmitting power.

Rivaling the spark stations in transmission distance, reliability and economy are the plants utilizing sustained electromagnetic waves, as suggested by Fessenden in 1901 and practised shortly thereafter, produced by gas-discharge oscillators or by radio-frequency alternators. Representatives of the first type are the intercommunicating installations at South San Francisco and Honolulu and the new naval station at Darien, Canal Zone, which it is expected will be able to exchange messages with Arlington. The only powerful example of the alternator wave-producing plant in the United States is at Tuckerton, N. J. This station is able to telegraph to, and receive from, the similar equipment at Eilwese, near Hanover, Germany, when "static" disturbances are not severe. These two installations represent in many ways the best practice of radiotelegraphy.

Another pair of transatlantic stations is about to be opened, however, and these are to be of the spark type. On page 425 of this issue Mr. John L. Hogan, Jr., describes the Marconi plants at Carnavon and Towyn,

Wales, which it was expected would be placed in touch with American stations at New Brunswick and Belmar, N. J., this fall. That this can be done is now somewhat doubtful, on account of the present European complications, and preparations are being made to open communication between New Brunswick and a powerful station being erected in Norway.

A most striking fact is that even to-day, nearly thirteen years after the first experiments in transatlantic radio and more than eight years after the establishing of the first regular night-time wireless between the United States and Great Britain, no commercial day-and-night radio service has been opened in competition with the Atlantic cables. The confidence and commercial daring shown by the erectors of the New Jersey and Welsh plants make them indeed worthy of complete success.

War and Industry

What effect will the war have on industrial activity? This is the question uppermost in the mind of every American business man. Deploring the consequences to humanity, he still is deeply concerned to know what the conflict will do to the material business of this nation. He knows that many consuming centers will inevitably turn to this country for products and that the great needs in South America which cannot be supplied by the foreign nations now commercially inactive must be met from here. In a few weeks war has caused a world-wide convulsion of business whose effects, like those of a convulsion of nature, may be lasting. In that short time the industrial development of great countries has been stopped, for the best of Europe's working population is now engaged in destructive, not productive, enterprise. That does not, however, indicate the full extent of the revolution, because those who ordinarily would be workers are not only not now engaged in production but they must be provided for at heavy cost, and this will fall, to a large extent, upon those least capable of meeting it.

Producing centers in this country are ready to meet the demands thrown upon them at short notice. The war has created markets for many classes of products in European lands and in the countries formerly supplied from Europe. Foodstuffs are wanted by nations at war, and those who produce foodstuffs or use them in canning or manufacturing will have their activities greatly increased. Goods to provision, outfit and clothe armies will also be in urgent demand. These needs will stimulate many producing industries temporarily and will mean sure markets at prices enhanced by a demand more insistent than can be supplied. Other products which this country will be asked to furnish are those that have been going from nations now at war to other lands. Studies will be made to show the extent of these. The importance of electrical exports has been pointed out in the articles published in the *Electrical World*, not because "one man's misfortune is another man's advantage," but by reason of a world-wide demand unfilled. A situation without precedent has arisen in our industries. Neutral countries are crippled because they relied upon European sources of capital and materials and European markets. Commercial relations cultivated during many years are swept away in the torrent of war.

No countries ever before deliberately sacrificed commercial life on the scale of the terrible exhibit in Europe. Trade between the countries directly engaged in the war is fatally hurt. Trade between each of those countries and other nations now at peace is interrupted and, except in the event of an early conclusion of hostilities, it cannot be easily restored. Too much capital and too many trained workmen will have been sacrificed to enable European nations to resume quickly their banking and commercial relationships with the countries which heretofore depended largely on their assistance. If peoples wholly innocent of part in the war are to have the burdens lightened for them, it will be because a strong nation like ours is ready and willing to do its part toward that end. Only by time and patience can the needs created by the commercial inactivity of Europe be met. Where this country has been dependent on Europe for raw materials, other materials or substitutes, so far as they can be found, will be introduced. Temporarily crippled, some manufacturers in this country will learn how to use what is at hand to take the place of that which they cannot now import. For the nations involved the terrors of war will not be lessened, but our activities will protect other peoples against the dire consequences of a strife not of their making.

The Railroad Rate Case

It is one of the minor fortunes of war that the European news almost buries the brief announcement that Eastern roads will ask the Interstate Commerce Commission to reopen the 5 per cent rate advance case. This will give the commission an opportunity to reverse the finding in which it denied the advance. Whether or not the roads have any reason to believe that the commission will act favorably on the application, they do not have to look far afield to find proof for that body that conditions have changed. The commission has been inclined to be optimistic over earnings and traffic and to feel that the glances of the roads toward disaster were calculated merely to influence the verdict; but even the arch-enemy of the carriers, which the commission is not, would admit candidly that their financial necessities are accentuated by the war. The practical fact is that the calculations of the commission were based on the expectation of a reasonable increase in revenues and reasonable arrangements for new capital requirements. At the present time judgment on these points is suspended. It is not argued that the roads will not be able to borrow money in the future. It is argued that at this moment no one can tell what rates will be necessary to invite public investment. However, if earnings are not large enough to attract new capital the railroad development cannot possibly take place.

The News of the Week

Activities and Events in the Electrical Field—Reports of Meetings—Commission Findings, Etc.

San Francisco Rates Found Confiscatory

A decision has been rendered by Mr. H. M. Wright, master in chancery of the United States Circuit Court at San Francisco, Cal., in regard to the electric rates established by the city of San Francisco for the Pacific Gas & Electric Company. The decision holds that the rates are confiscatory. It is found that the company was earning only 5.82 per cent on the value of the property as fixed by the master in chancery. The city authorities have voluntarily granted authority to the company to establish a higher schedule of electric rates. This schedule, it is stated, is satisfactory to the company.

Mr. Wright rendered a decision recently that the gas rates established by the city of San Francisco for the company were confiscatory. The earnings in that case were found to be but 5.21 per cent on the valuation established by the master in chancery.

Trust Regulation Still in the Senate

The administration's anti-trust legislation program has made further progress in the Senate. The Clayton anti-trust bill, supplementing the Sherman law, has received attention. Several important amendments have been agreed to, and Senator Culberson, chairman of the judiciary committee, who is in charge of the bill, hopes to get a final vote on the measure very soon.

Senator Newlands, chairman of the conference committee, has attempted to get the conferees together on the federal trade commission bill. There is a strong sentiment in favor of doing nothing further with the trade commission bill until the Senate has disposed of the Clayton anti-trust bill, the reason given being that the two measures are so closely related that everything should be done to make them dovetail.

The Rayburn stock and bond issue bill, regulating the issue of securities by common carriers, has been reported to the Senate and is awaiting its turn, which is to come as soon as the Clayton bill has been passed.

Convention of Edison Sales Managers

The fifteenth annual convention of the sales managers of the large Edison companies was held at Association Island, N. Y., Aug. 24, 25 and 26. The meeting was more successful and the discussion even more animated and profitable than those of previous years. Unfortunately, however, it is the custom of the association to withhold publication of the papers and discussions until released by the authors. The program was as follows: "Central-Station Advertising Plan," by Mr. H. K. Mohr, of the Philadelphia Electric Company; "Old Store Rates," by Mr. Douglass Burnett, of the Consolidated Gas, Electric Light & Power Company of Baltimore; "Service Inspection," by Mr. C. H. Stevens, of the Edison Electric Illuminating Company of Brooklyn; "Rates for Residence and Business Lighting," by Mr. H. A. Brooks, of the Consolidated Gas, Electric Light & Power Company of Baltimore; "Telephone Order System," by Mr. R. H. Wright, of the Cleveland Electric Illuminating Company, and "The Present Status of Electric Furnaces."

Those in attendance included Messrs. L. R. Wallis, W. G. Stetson and R. S. Hale, of the Boston Edison company; A. A. Pope, W. H. Whitton, E. F. Tweedy and H. Robinson, of the New York Edison Company, J. F. Becker, J. V. Guilfoyle and A. F. Berry, of the United Electric Light & Power Company of New York; T. I. Jones and C. H. Stevens, of the Brooklyn Edison company; R. R. Young and H. H. Holding, of the Public Service Electric Company of Newark, N. J.; J. D. Israel, J. Meyer and H. K. Mohr, of the Philadelphia Electric Company; D. Burnett, C. E. Robertson and H. A. Brooks, of the Consolidated Gas, Electric Light & Power Company of Baltimore; J. C. McLaughlin, of the Washington Railway & Electric Company, Washington, D. C.; Miss F. M. Sheridan, Messrs. D. B. South and E. L. Crosby, of the Detroit Edison Company; Messrs. Mathias Turner and R. H. Wright, of the Cleveland Electric Illuminating Company; P. H. Kemble and L. R. McCleary, of the Union Gas & Electric Company of Cincinnati, and F. D. Beardslee, of the Union Electric Light & Power Company of St. Louis.

Action on Conservation Bills

The House of Representatives, making slow headway on the Ferris bill for the development of water-power and the use of public lands in relation thereto, is expected to send that measure to the Senate, considerably amended, in the last days of August. Even then the Senate will not have passed the Adamson general dam act, and if the experience which the bill met in the House is to be reflected in the Senate, with its larger ideas of unending discussion, it will be late in the fall before the first of the conservation measures is sent to the White House for the signature of the President.

At present the Ferris bill is running a severe gantlet on the floor of the House, as the charge is made by Eastern men, regardless of party alliances, that the measure is not carefully drawn. No doubt it will be amended before its final passage. An important amendment has already been accepted by the House, sitting in committee of the whole, which takes from the bill what some of the members called "the monopolistic features." Instead of the Secretary of the Interior being empowered to allow any one consumer to use any or all of the electrical energy generated in a plant affected by the Ferris bill, the measure has been amended so that the consent of the Secretary must be a special matter if any consumer is to get more than 50 per cent of the product.

After the Ferris bill leaves the House, the measure providing for the leasing of coal lands in Alaska is in order. After this the bill to authorize exploration for and disposition of coal, oil, gas, potassium or sodium will be in order, and the "radium" bill is the last of the measures scheduled to be passed by the House at this session.

Edison Illuminating Companies' Convention Program

At the convention of the Association of Edison Illuminating Companies, to be held at the Hotel Greenbrier, White Sulphur Springs, W. Va., Sept. 15, 16 and 17, the following papers and addresses will be presented:

"Accounting for Variation in Coal Economy of a Large Central Station," Messrs. Robert Dillon and Charles H. Parker; "Further Development of the Business in Case Lamp Efficiencies Continue to Improve," Mr. R. S. Hale; "Industrial Education," Dr. Charles P. Steinmetz; "Mercury Turbine Developments and Possibilities," Mr. W. L. R. Emmet; "Protection Against Effects of Grounds and Short-Circuits," Mr. Paul M. Lincoln; "Safety in the Electric Lighting Industry," Messrs. J. L. Murrie and J. C. Robinson; "Scientific Management of Public Utilities," by a representative of the Penn Central Light & Power Company; "Single-Phase Loads from Polyphase Systems," Mr. B. G. Lamme; "The Central Station in Its Relation to Dust and Cinder Problems in Cities," Mr. R. P. Bolton, Dr. J. A. Deghuee and Mr. C. B. Grady; "The Changing Attitude of Employers," Mr. Gerald Stanley Lee; "The Illumination of the Panama-Pacific Exposition," Mr. W. D'Arcy Ryan; "Workmen's Compensation and the Physical Examination of Employees," Mr. J. B. Murray.

Committee reports will also be presented by the following chairmen of committees: Electric heating and kindred uses of electricity, Mr. Joseph D. Israel; electric storage batteries, Mr. S. C. Harris; electric vehicles, Mr. George H. Jones; high potentials, Mr. L. L. Elden; incandescent lamps, Mr. J. W. Lieb; load-factor, Mr. J. W. Lieb; meters, Mr. S. G. Rhodes; national code, Mr. P. H. Bartlett; steam operation, Mr. J. D. Andrew; street lighting, Mr. J. W. Cowles.

Mr. Arthur Williams, New York City, is president of the Association of Edison Illuminating Companies, and Mr. Walter Neumuller, Irving Place and Fifteenth Street, New York, is assistant secretary.

War Will Not Affect Panama-Pacific Exposition

We have received advices to the effect that the war in Europe will not cause a postponement of the Panama-Pacific International Exposition. President C. C. Moore states that at no time had the directors a thought of postponing the opening date. According to Lieut. G. W. Danforth, chief of machinery exhibits, the conditions now existing are that forty-four states of the Union have made appropriations and are actively engaged in building state pavilions and preparing their exhibits. The various state appropriations are made for a stated period and a delay in the Exposition would necessitate going to the legislatures for more money. The exhibit palaces are completed, the installations are already begun on a large scale, and it is the desire of the exhibitors to proceed with the arrangements as they have planned.

"Thirty-four foreign nations," Lieutenant Danforth said, "have made appropriations and are actively engaged in erecting their official buildings and preparing their exhibits regardless of war, so that any postponement in the Exposition would complicate the situation. There is nothing in the present situation that seems likely to affect the plans or success of the Exposition. Of the thirty-four foreign nations that are now preparing buildings and exhibits, only three are concerned in war, and none of these has yet indicated that its arrangements for participation will be interrupted. France and Italy have cabled that their preparations to participate are proceeding despite the war. The possible loss of exhibits from countries involved in war will be replaced by increase in other directions. The effect on the attendance will be favorable, for whatever is lost from Europe will be ten times compensated by Americans and South Americans, especially citizens of the Argentine, coming here instead of going to Europe. The Argentine government cabled Aug. 13 that it was preparing to increase its exhibits and accordingly requested the Exposition officials to assign additional space to it. Brazil also cabled that it intended to proceed with larger plans for an exhibit at this Exposition. For the first time in its history China has made application to display machinery, and space has been assigned to the Chinese Republic in Machinery Palace in addition to assignments in the other exhibit palaces.

"The forces of peace and the necessity for commercial activity are greater than the forces of war, and as soon as America recovers from the inconvenience caused by the transatlantic conflict our country will doubtless take advantage of the splendid opportunity before it.

MACHINERY PALACE, PANAMA-PACIFIC INTERNATIONAL EXPOSITION

"The operation of the new regional banks and the added number of ships flying the American flag, making quick time from coast to coast through the Panama Canal, place the United States in the most favorable position in the world, rich, self-supporting and at peace with all, and the Panama-Pacific International Exposition offers the quickest and most effective medium for bringing American manufactures to the attention of the distributers and consumers of the world."

Nevada Electrical Association

The Nevada Electrical Association will meet at the State University, Reno, Nev., Sept. 7, in conjunction with the State first-aid and mine-rescue sessions scheduled for the same day. Among the papers to be presented are the following: "The Beowawe Locomobile Plant," by Mr. A. N. Voss, Buckhorn Mines, Beowawe, Nev.; "Electrical Control," by Mr. E. P. Cullinan, Belmont Mines, Tonopah, Nev.; "Drying Out Wet Motors," by Mr. J. K. Poe, Consolidated Mines, Goldfield, Nev.; "The Edison Storage Battery," by Mr. E. M. Cutting, Orange, N. J., and "The Nitrogen-Filled Lamp," by Mr. A. G. Jones, Harrison, N. J. Papers on the protection of meters against lightning will also be presented by superintendents of several electric power and transmission companies of the State.

Southeastern Section, N. E. L. A.

The second annual convention of the Southeastern Section of the National Electric Light Association was held at Isle of Palms, Charleston, S. C., Aug. 19 to 21, the attendance of more than 100 being well representative of central stations in Virginia, North Carolina, South Carolina, Georgia, Alabama and Florida. A number of entertainment features marked the program, including dances, automobile rides, steamboat excursions to Fort Sumter and the Charleston Navy Yard, etc.

Following the address of the president, Mr. T. W. Peters, Columbus, Ga., on Wednesday morning, Messrs. A. L. Dixon and F. N. Carle, Long Island City, N. Y., presented a paper on "The Electric Vehicle—the Central Station's Greatest Opportunity," in which the authors discussed the future of electric transportation in the South. Mr. Norman B. Hickox, Knoxville, Tenn., followed with a paper entitled "Commercializing Electrical Advertising," in which plans for sign campaigns were outlined.

Technical Topics

Mr. E. S. Moorer, Atlanta, Ga., opened Thursday's session with a paper on inductive interference between telephone and transmission lines. Mr. Moorer described the causes of this class of troubles and suggested means for their correction. The paper was discussed briefly by Messsrs. C. M. Young, Columbus, Ga., and G. K. Selden, Atlanta, Ga. "Feeder Voltage Regulation" was next discussed in a paper by Mr. A. D. Fishel, Pittsburgh, Pa., who described the application of automatic apparatus for single and three-phase lines.

"Recent Developments in Incandescent Lamps" was the subject of a joint paper by Messrs. T. W. Moore, Harrison, N. J., and Henry Schroeder, Atlanta, Ga. Emphasis was laid on nitrogen-filled and high-current lamps. Mr. Martin, Atlanta, Ga., and Mr. George Wygant, Tampa, Fla., took part in the discussion.

Public Relations and Commission Regulation

"How, When and Where—A Few Irregular Thoughts on Regulation" was the inviting title of Mr. John S. Bleecker's paper, in which the author suggested that a utility commission be ready to apply its regulative function whenever the standard of service is departed from, as well as at times when the rate of return on investment is improper. Mr. J. E. Bigham, Tampa, Fla., called attention to the changing conditions which affect the problems of fixing rates and returns. He closed with a strong plea against government ownership of telephone and telegraph lines. The convention also adopted a resolution indorsing the expression of the Railroad Commission of Georgia to the effect that competition can never be "a consistent and proper regulator of rates and other conditions in the public utility field."

The report of the public policy committee, prepared by Mr. Bleecker, declared that the policy of regulation should prevent undue returns on investments in public utilities, but at the same time it should insure reasonable return. Efficient regulation, therefore, implies both prohibition of competition and prohibition of discrimination. And if this principle of regulation is correct, asserted the committee, the regulating body should have as much authority over municipally owned plants, both before and after their establishment, as it has over privately owned plants.

At the Friday morning session Mr. S. A. Sewall, New York City, spoke of the national activities of the N. E. L. A., of which he is assistant secretary. Mr. MacDougal Dexter followed with a description of a new method of indicating and recording river stages. The scheme employs compressed air and has been used with success at the plant of the Columbus Power Company. An experience meeting and informal discussion of electrical topics followed.

Following is the list of officers elected for 1914:

President, Mr. J. E. Bigham, Tampa, Fla.; first vice-president, Mr. W. A. Belcher, Cordele, Ga.; second vice-president, Mr. C. M. Benedict, Charleston, S. C. Executive committee, Messrs. C. D. Flanagin, Athens, Ga.; W. E. Mitchell, Birmingham, Ala.; C. I. Day, Jacksonville, Fla.; H. W. Plummer, Asheville, N. C.; Alfred Wallace, Columbia, S. C. Rate committee—Mr. W. R. Collier, Atlanta, Ga. Membership and finance committee—Mr. W. A. Belcher, Cordele, Ga. Public policy committee—Messrs. P. S. Awkright, Atlanta, Ga.; John S. Bleecker, Columbus, Ga., and Z. V. Taylor, Charlotte, N. C.

Mr. George H. Wygant, Tampa Electric Company, Tampa, Fla., was appointed secretary-treasurer.

The Electrolytes

Within the last few months a new society—a sort of "jolly good fellows'" society in one branch of the electrical industry—has made its appearance in Chicago. It bears the name of The Electrolytes, and its existence was hinted at in a note printed in the N. E. L. A. *Convention Daily* at Philadelphia on June 3. The new association is a secret society and is, in fact, an organization to promote good-fellowship in the electric-vehicle industry and its allied lines. It has weird ceremonies and an elaborate initiation, never neglects the "eats" and is not averse to song and story. Membership is by invitation. Only those connected in some way with the electric-vehicle industry are invited to join, but nevertheless the organization is in no sense a technical or industrial organization—it is purely social. It is at present confined to Chicago, but possibly may spread out and become a national society. The officers have curious titles, as may be judged by the following list: Grand hi lite, Mr. L. E. Wagner, Baker Electric Sales Company; imperial rectifier, Mr. Otto A. Suttmueller, Hyde Park Hotel Garage; grand circuit breaker, Mr. Paul Frank; recording wattmeter, Mr. M. E. Davis; grand high frequency, Mr. C. B. Frayer, Edison Storage Battery Company. For Aug. 29 the organization planned to give a clambake and "field night."

Meter Tax Law Invalid in Salt Lake City

By a decision of the Utah Supreme Court the ordinance passed by the City Council of Salt Lake City four years ago levying an annual license tax of $1 against each meter in use by the Utah Light & Railway Company is held to be invalid on the ground that it is not uniform in its application.

The right of the city to pass an ordinance requiring such a license fee is upheld by the court, and it is announced that the matter of passing an amended ordinance to meet the requirements of the decision will be laid before the city commission in the near future.

The court says that a company selling by flat rate would be exempt from the license tax under the present ordinance, and for that reason it is class legislation in violation of the fourteenth amendment of the federal constitution.

The company contended that the city had not the right to impose an "additional burden," declaring that under its franchise an "additional burden" is prohibited. The court rules against this contention, holding that the right to levy the tax is inherent with the city and cannot be bartered away.

The War's Effect on the Electrical Industry

Entire Art in Europe Suffers Technical and Commercial Setback—Opportunities Afforded American Manufacturers to Supply the Markets of the World Now Barred from Regular Sources—Statistics Bearing on European Electrical Exports and Advice from Experienced Observers on Ways and Means of Meeting South American Needs

WRECKAGE OF THE INDUSTRY ABROAD

How It Affects the American Market and What It Means to the Art, Technically and Commercially

BY DR. LOUIS BELL

The present war of giants seems like the terrific visions of a nightmare, too horrible to outlast, save as vague memories, the hour of waking. It is well-nigh impossible to realize that the Pan-European war dreaded for a generation past is actually in progress, breaking out without warning like an eruption from the bottomless pit itself, and sparing nothing human or of human contrivance. Whatever the issue, it means the setting back of our vaunted civilization for many a long year and the wrecking over half the world of the finest achievements of man's industry.

We in this country are fortunate indeed in being free from entanglements and able to extend a helping hand to the war-stricken in so far as equity permits. And it would seem that our first duty lies in keeping from utter ruin the arts of peace and lessening as best we may the frightful results of the strife upon the industries of mankind. In the special field of electrical engineering and manufacturing we can be of peculiar service as the only nation upon which war has not laid the hand that strangles. The effect of the struggle upon technical industry of every kind is hard to overestimate. Its first withering touch removes from the ranks of labor every workman of active years who is not absolutely needed to provide material of war in every country having compulsory military service. Imagine if you can the paralyzing effect of a universal lock-out in every occupation of all men between, say, twenty and forty, quickly followed by the expulsion of most of those in the next decade of life. Imagine further a pestilence breaking out among the unemployed, destined to decimate them and to leave a large share of the survivors broken in health and spirit, and you have some feeble notion of the wreckage of this demoniac fight.

European Production Wholly Shut Down

In electrical manufacturing, France, Belgium, Austria-Hungary, and pre-eminently Germany, have had a large share in the world's markets. Their factories are known everywhere, and now the supply from them is practically cut off by the cessation of demand, the loss of labor and the lack of transportation. Some work must be done even to supply military necessities, but it must be accomplished by those beyond military age and by women and children. So far as active commercial work goes, one may as well reckon every door as closed in all the warring Continental countries. Nor in this dreadful exigency would much be done even if there were no dearth of labor, since money must be hoarded for actual necessities. Hence central stations will feel the pinch almost from the first, and their business will in a way measure the extent to which electrical service has outgrown the stage of being a luxury. Under existing conditions the swift increase in the cost of food will overshadow every other economical consideration.

There is besides the possibility that many plants, both manufacturing and operating, will be destroyed in the progress of hostilities. Even now the factories in and about Liège are deserted, if not actually wrecked by the German shells. Even if the fortunes of war spare Paris, Berlin and Vienna, the big works near the eastern and western fighting zones, to whomsoever belonging, are in no small danger of destruction. For the manufacture of heavy machinery there are left thus far uninvolved the small groups of important Swiss works, some of lesser note in Italy, and such residuum of the British works as may be able to keep up activity. Probably they will hold up with fair success since England will call relatively few men to the colors and, above all, holds substantial control of the seas, with the resulting freedom of transportation which means so much to industry. It is to be hoped that brave little Switzerland will not be embroiled as was Belgium by the violation of her boundaries, but if she should be, her greatest plants lie dangerously near the frontier. The Scandinavian countries, like Italy, have not yet drawn sword, but occupy a somewhat precarious position. Of all the electrical branches the manufacture of incandescent lamps will perhaps suffer least owing to the small proportion of male labor involved and the steady demand for necessary replacements. But there is a strong likelihood that the tungsten supply will quickly run short in some of the countries affected and drive the users back to carbon.

Resumption of Manufacture Waits on Peace

The manufacture of supplies is certain to fall off enormously from lessened demand and facilities, and instruments must suffer for the same cause, so that, all in all, electrical production will in great measure cease on the Continent until peace is in sight, and even then it may take a long time before conditions are settled enough for resumption of business on any large scale. And when peace comes the toll that Death has taken from the world's workmen will be heavily felt.

Here in the United States we must suffer somewhat from the feeling of financial insecurity that disturbs that normal condition of credits on which business depends. Fortunately, we are not vitally dependent upon the interior of Europe for electrical materials, and to the coasts we have access. The most serious single item of import is that of electrodes for flame-arc lamps and for the remaining inclosed lamps. These come from Germany and no very large stock is carried on this side of the water, so that if the war is prolonged our American makers will have to supply the demand and can subsequently hold the market permanently if they will but exert themselves. As England and France are fellows in this deprivation, the effect of the war on lighting technique may be considerable. A few years ago the check on the imports of glassware would have been serious, but our manufacturers have made rapid progress and the present situation is good. There may be temporary inconveniences in minor matters, such as getting some necessary materials, but, with the sea practically clear for commerce, only Germany and Austria-Hungary are virtually blockaded by hostilities, and save for some delays in transportation things are likely to go along well enough.

The gravest menace to our electrical industries is the

stringency in the money market that checks enterprise. There are signs already of some relief, and when the war enters its second stage in which the rapidity of action is less and the struggle turns to one of organized endurance conditions are likely to improve in this particular. After all, cash under lock and key is unproductive and its owners soon tire of holding it tight. Meanwhile, the markets of this hemisphere are open to us as they have not been before in the memory of this generation. All the great manufacturing producers are in the fight, and the world's needs must be supplied from all sources still available. The electrical trade of South America will now turn to the United States as the only large source of supplies left, and reasonable care in encouraging it will perhaps make up in the export trade all that timidity may lose us at home. It is a somewhat grim notion, this gaining the trade lost by the fighting hordes, but it looks like a straightforward matter of necessity, as it is in the matter of selling foodstuffs—the world needs what we have to offer and buys it in the best available market. For, whether the war be brief or long-drawn-out, the struggling nations are commercially seriously crippled now and for some time to come will be staggering under burdens of debt that will hinder the resumption of industry. Capital spent in war is a terrible loss to the world in that it destroys not only the means of production but the producers themselves, and our country can hardly serve humanity better than by refusing to allow loans for the promotion of bloodshed while reserving its resources for the promotion of the world's industry when peace comes at last.

HOW TO ENTER SOUTH AMERICA

Mr. E. F. Colyer Gives Practical Advice, Based on Long Experience, in Regard to Necessary Knowledge and Practices

Mr. E. F. Colyer, in charge of the Latin-American section of the foreign department of the General Electric Company, has had much experience in Central America and South America. In discussing export trade matters with a representative of the *Electrical World* he said that no commercial traveler who went to either Central America or South America could do much if he did not know the language spoken in the country he visited. In all the countries excepting Brazil, where Portuguese is spoken, and British, French and Dutch Guiana, it is necessary to talk Spanish. Although some of the plants are owned by English or Americans, the miscellaneous trade, excepting in the large cities, is principally in the hands of native firms, and with these Mr. Colyer believes that a foreigner who had to talk through an interpreter could make very little progress. This, of course, applies to travelers who are trying to make actual sales. If a representative of an American manufacturer goes to the country merely in order to get information concerning the outlook for his goods it is not so imperative that he speak the language. It will be found that many of the plants and stores in Central American countries have connections with commission houses in New York and New Orleans.

Advantage of Proper Credentials

In offering goods to residents of the Central and South American countries it is most desirable, Mr. Colyer stated, to have letters of introduction in order that a friendly relation may be established before actual business is attempted. As the banks of this country do not often have correspondents there, they are not likely to be of much assistance to commercial travelers. If it is possible to get a letter of introduction to a resident banker or to establish a business connection with him, that is an advantage. In all cases the first man to be seen is the consul. American consuls are always glad to assist any man who is on a business trip, and frequently they are able to give much information that is of service. A representative of a large well-known corporation is in a somewhat different position from one who represents an unknown concern. Correspondence between a company and a possible consumer is, of course, a step toward a personal introduction that will be found to be a help.

Large Territory, Scant Sales

Mr. Colyer emphasized the fact that much of the business with the greater part of Central and South America is apt to be small in amount, and that some time is required to develop the market. He figures the traveling expense of a salesman in Central or South American countries at pretty close to $5,000 a year. If a salesman were to attempt to cover the entire field, he would find the territory so large that he might easily become discouraged. Business is not transacted in accordance with the practices that prevail here. There is little prospect that several orders a day may be taken. Often a salesman will not receive a single order until he has been on the ground for weeks.

Mr. Colyer said that, with the possible exception of Guatemala, which is more nearly a market for European countries, the Central American countries patronize mainly the manufacturers of this country. Between the commission and jobbing houses and local representatives of American firms, Central America is now pretty well covered by manufacturers of this country.

When and How to Travel

Mr. Colyer was asked about the time of the year when trips should be made by representatives of manufacturers. He said that it varied with the section visited, but that it was desirable to avoid the rainy season. Clothes suitable for the tropics should be taken, with a light overcoat for the altitudes. On account of the condition of the rivers in Colombia it is possible to get into the interior of that country readily only during two seasons of the year.

Misinformation About Credits.

The question of granting credit, Mr. Colyer believes, is not radically different in Central and South America from other countries. A good deal of misinformation has been published about the general necessity of very long credits, which are not the invariable rule. In some lines extended credits must be given, while in other lines it would be poor business policy. The practice in different markets and in different lines varies very widely.

Brazil, Argentina and Chile Offer Best Markets

Since the foreign trade in Brazil, the Argentine Republic and Chile is several times as great as that of the rest of Latin America, these countries naturally offer the most attractive market for American manufacturers. They have in the past been supplied principally from Europe. They have large modern cities, are well provided with railways, and business methods will be found to differ less widely from ours than is the case in other sections.

Care in Packing Essential

The question of the form of package and method of packing has been discussed often in connection with Central and South American trade. Mr. Colyer said that the important point in packing for export is to make the package so carefully that goods will not be

broken. In some countries buyers stipulate packing for mule-back transportation. If this is mentioned, it is absolutely imperative that the instructions be followed. On the west coast the conditions necessary to meet in landing freight are very bad, and stout packing is required. In other countries, where duties are assessed in accordance with the weight, buyers stipulate that the package be as light as possible.

STUDY OF FOREIGN TRADE NECESSARY

Mr. W. J. Clark Calls Attention to the Banking and Credit Facilities Which Have Helped Foreign Nations

Mr. W. J. Clark, manager of the traction department of the General Electric Company, takes an optimistic view of the ultimate effect of the war upon industrial conditions in this country, but he feels that it will take time to adapt our financial machinery to the new conditions. European financiers have made a diligent study of foreign business for so long a time that Americans cannot expect to learn the art of dealing with South American countries, especially, in a few months.

Study of Credits

In the opinion of Mr. Clark a vital feature in the European industrial achievements abroad has been the attention given to the financial standing of individual foreign customers. The status of each as a creditor is studied carefully and suitable terms are made for him. Credits up to two years are sometimes allowed with a reasonable interest rate which can be discounted at home, making a profitable transaction for seller as well as purchaser. Belgium has played an important part in the financing of foreign undertakings. Owing to favorable laws, to the supposedly neutral character of the country and to the excellent Belgium consular service, it has been to a considerable extent a clearing house for them. Capitalists in other countries invested through Belgium corporations somewhat as though they were holding companies. The capital thus placed outside of Belgium in public utilities of various kinds is at least $1,000,000,000. There are also vast sums invested directly by French, German and other financiers. In South America the public utilities, with the exception of the Pearson, Grace and minor interests, are financed in Europe principally, directly or indirectly, from Germany.

Quality of Our Products

To offset the conditions outlined, Mr. Clark believes that, aside from the temporary and possibly permanent conditions produced by the present war, the principal advantages possessed by American manufacturers lie in the quality of their products and the ability of their selling forces. That our manufacturers are beginning to appreciate their opportunity is shown by the activity of the United States Steel Corporation and a few other enterprising organizations.

The General Electric Company does much of its South American business through its London office, opened fourteen years or more ago, largely to handle foreign business. A very large business is done here because London is the natural center for South American trading. The company also controls the South American General Electric Company with headquarters at Buenos Aires, and it has regular office headquarters at Rio de Janiero. In addition, a large business is handled by W. R. Grace & Company in the west and southwest, and by Amsinck & Company in the north.

In discussing the probable effects of the war upon financial and industrial conditions, Mr. Clark stated that he expects some small immediate benefits and larger ultimate benefits. At first there should be an increase in the demand for small supplies for which the purchaser can pay directly. The present plants must be kept up and supplies will be required at once. Ultimately foreign projects will have to be partially, and possibly largely, financed from America. Europe up to this time has largely financed all foreign undertakings, but America must shoulder part of the burden because European money will be needed at home. As foreign ownership influences trade to a large extent, it follows that as fast as American money is invested abroad American trade will follow it. South America has little money of its own and hence must depend upon the outside world for capital. The conditions for investment, however, are favorable, and they are constantly becoming less so in this country, at least so far as public utilities are concerned.

Influx of Immigrants After the War

In Mr. Clark's opinion the close of the war will be followed by an influx of very desirable immigrants, who will flee from the burdens which inevitably follow a great war. South America will share in this benefit as it did fifty years ago, when some of the present prosperous Irish and other families settled there, particularly in the River Platte country. The reaction of the war will probably also be seen in the increased costs of manufacturing in Europe, both in labor and supplies, through high taxes and shortages due to destruction and non-production. These will act as a protection to American industries, enabling them to offset the results of tariff reductions.

ENGLISH AND GERMAN ELECTRIC EXPORTS

Statistics of Exports from Electrical Industries of Germany to Neutral Countries, Nations at War and Colonies

In our issue of Aug. 15 and 22 an account, with tables, was given of the American and British electrical export trade. The electrical exports from the United States for 1912 were shown to have been somewhat in excess of $26,000,000 and the British electrical exports for the same period were shown to have been over $34,000,000, or 30 per cent more than the American trade. Germany for 1912 exported electrical goods having a value of over $55,000,000. This figure is almost the sum of the American and British combined exports. It is over 110 per cent more than the American electrical export trade and almost 62 per cent greater than Great Britain's export trade.

Germany's Electrical Exports and Imports

Germany annually took from Great Britain electrical goods valued at over $570,000 and from the United States electrical goods to the value of $215,000. At the same time Germany exported to Great Britain electrical goods valued at over $4,000,000 and to the United States electrical goods valued at over $450,000, as against the combined imports from the two countries of $785,000. In other words, Germany's electrical exports to United States and Great Britain amounted to six times her exports from those two countries. Her exports to the United States alone were 100 per cent more than her imports from this country.

Austria's Electrical Foreign Trade

In the case of Austria-Hungary Great Britain's exports were negligible, America's trade amounted to but $24,000, while Germany's trade had a value of almost $5,000,000. In other words, Germany had a monopoly

of the Austro-Hungarian electrical import trade. Servia imported practically no electrical goods from either England or America. From Germany, however, she imported electrical goods valued at $80,000.

French Imports and Exports

France imported approximately $400,000 of electrical goods from America, $1,000,000 from Great Britain, and $2,280,000 from Germany. Such totals make America's electrical export trade to France seem extremely small. Russia took less than $60,000 worth of electrical goods from the United States, approximately $450,000 worth from Great Britain and over $6,660,000 worth from Germany. This can mean but one thing, that Germany practically controlled the Russian electrical import trade.

TABLE I—VALUE OF GERMAN ELECTRICAL EXPORTS DURING 1912 TO NEUTRAL COUNTRIES

Country	Machinery	Lamps	Miscellaneous (Including Remainder)
Denmark	$139,100	$291,400	$1,057,000
Italy	1,057,000	980,000	2,180,000
Netherlands	646,500	16,770	1,963,000
Norway	424,000	286,000	879,000
Portugal	80,800	64,750	117,500
Spain	771,000	723,000	987,500
Sweden	132,000	472,000	1,530,000
Turkey	19,170	14,630	134,700
Mexico	142,600	157,000	179,400
Cuba	.....	71,700	15,350
United States	.....	279,000	223,400
Argentina	1,139,000	466,000	2,382,000
Brazil	604,000	446,000	613,000
Chile	280,800	201,200	718,000
Bolivia	.....	17,260	.....
Colombia	.....	17,980	.....
Peru	13,180	25,430	5,030
Uruguay	110,700	84,600	338,000
China	60,650	198,300	193,800
Siam	2,639	11,520	22,520
Portuguese Africa	.....	.....	13,430
Egypt	9,350	16,300	74,300
Other neutral countries*	633,500	750,000	3,120,000

*Includes Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Salvador, Santo Domingo, Ecuador, Dutch Guiana, Paraguay, Venezuela, Dutch East Indies, Greece, Roumania, Switzerland and Dutch India.

German Control of Electrical Trade in Europe

Belgium took somewhat over $150,000 in electrical goods from the United States, almost $350,000 from England and more than $4,000,000 from Germany. Japan imported electrical goods to the value of $2,350,000 from America, more than $1,500,000 from Great Britain and over $2,600,000 from Germany.

Germany, in other words, easily controlled the electrical import trade of Europe. England was ahead of America, principally in the electrical machinery trade, but Germany with one or two minor exceptions was ahead of both countries in practically every branch of the trade.

TABLE II—VALUE OF GERMAN ELECTRICAL EXPORTS DURING 1912 TO COLONIES OF COUNTRIES NOW AT WAR

Country	Machinery	Lamps	Miscellaneous (Including Remainder)
BRITISH:			
Canada	$718	$156,500	$102,800
Australia and Tasmania	124,800	116,400	214,400
Others	433,800	240,700	183,600
GERMAN	5,988	.....	96,700

Considering next the colonies of those countries now at war, Germany did practically the entire export trade with her own colonies, although the amounts involved were rather small, being approximately $150,000. America's exports to German colonies were less than $1,000, and England's trade with them was so small that it was not separately listed. Neither Germany nor England appears to have sent any electrical goods to French possessions. America sent to them roughly $13,000 worth of electrical goods.

It was in the trade with English colonies that Germany made a poor showing. As was natural, England led, with exports to the value of $20,000,000. America came next, with $11,000,000, and Germany was last, with $1,500,000. The great difference was in the trade with Canada. Canada's imports from America were roughly $9,000,000; from England they were $1,700,000, and from Germany they were $250,000.

TABLE III—VALUE OF GERMAN ELECTRICAL EXPORTS WITH COUNTRIES NOW AT WAR

Country	Machinery	Lamps	Miscellaneous (Including Remainder)
Great Britain	$614,000	$1,664,000	$1,730,000
Austria-Hungary	1,080,000	1,093,700	2,707,000
Servia	21,580	12,950	44,800
France	560,000	702,000	1,020,000
Russia	1,203,650	2,590,500	2,869,000
Belgium	867,000	546,000	2,588,000
Japan	823,500	215,900	1,670,000

Trade with Central and South American Republics

The Central and South American republics for which we have comparative figures are Mexico, Argentina, Brazil and Chile. Mexico's electrical imports from Germany were approximately $500,000; from England they were but $50,000, while from America they were $3,000,000. America led Germany and England in every item of any importance.

Argentina has been importing $4,000,000 worth of electrical goods from Germany, $3,000,000 from England, and a paltry $600,000 from the United States. In other words, Argentina has been importing from the three countries $7,600,000 of electrical goods and America has been supplying less than one-twelfth of that amount. In the machinery trade England and Germany practically broke even; but in the lamp trade and the miscellaneous trade Germany had the lead by far. America was third in every case.

TABLE IV—COMPARATIVE FIGURES FOR GERMAN ELECTRICAL EXPORTS

First Half of	Values
1910	$24,680,000
1911	23,800,000
1912	24,860,000
1913	30,300,000
1914	35,500,000

In Brazil, however, America was more fortunate. The American electrical exports to Brazil were $1,750,000, and the German exports were $1,660,000. Germany led in the machinery trade, with England next and America last. Germany led in the lamp trade, with America second and England third. In the miscellaneous trade, however, which includes among other items telephone and telegraph apparatus, America was foremost.

In Chile Germany's trade was more than the combined trade of England and America. Germany's trade

amounted to $1,200,000, England's amounted to $530,000, and America's amounted to $420,000. The principal differences were in the lamp and miscellaneous trade.

To sum up for the four southern republics mentioned, Germany's trade was $7,300,000, England's was $5,300,000, and America's was $6,020,000. With the war threatening to be a drawn-out affair, it is seen that there is in these countries an annual electrical business of approximately $12,000,000 awaiting the American electrical manufacturer.

LONDON ELECTRICAL PAPERS ON THE WAR

They Speak Calmly and Hopefully About the Effect on English Trade, and Discuss the End of Business with the Continent

Issues of the London electrical papers speak calmly and not without confidence about the condition of electrical activity.

The *Electrical Review* of London said in part on Aug. 7: "The calm and steady way in which London—speaking principally for the City and its financial organizations—has withstood the shock of the crisis is rational ground for assuming that no new alarm is likely further to unsettle it. . . . Out of the evil good will come. Canada and the United States, for example, may find their financial salvation by reason of the present grave condition of affairs. Afterward there will arise such activity in trade, in metals, in stocks and shares, as few can remember. These, however, are for the future. The immediate outlook is too serious to be illumined by more than hope, but that hope is fortified and cheered by the steadfast way in which the financial institutions of London and the people whom they affect have met a situation that might have precipitated a panic which nobody could have called surprising."

Effect on Electrical Trade

Under the title "The Electrical Trade and War," *The Electrician* of London said in part in its issue of Aug. 7: "The outlook for trade, and especially the electrical trade, will, it is confidently hoped, become brighter as the first operations of the war are concluded. Unfortunately for all concerned, those firms which are now and have been for many years trading in electric plant, apparatus and material from the Continent, and particularly Central Europe, will find themselves faced with no alternative but to close their doors.

"The blow which statesmen have dreaded, and which commercial men were hopeful that trade ties would avert, has fallen with appalling swiftness upon business firms engaged in the re-export of Continental products and material of an electrical and kindred character. It is improbable that there will be a resumption of the same commercial relations between this country and Germany for many a long day, not merely in electrical but in other products. In fact, our inter-trade with the Continent in electrical material, both raw and finished, will have already completely ceased. The minds of British manufacturers are compelled to turn to those outlets for trade which the distant parts of the empire and other unaffected countries offer. It is to be hoped that shipping facilities may be such as to maintain the flow of trade to our colonies and insure some market for our productions. Many electrical firms do big business with the colonies and will have in hand contracts and orders which they should be able to complete. Where they have used raw material or semi-finished parts from the Continent they may now turn to the home producer, who will be only too glad of the business.

"There must be many electrical firms who will be kept going with existing and new government contracts. In addition, the recent records of tenders accepted by municipalities for Continental plans prove that these orders will have to be replaced in this country, for it is inconceivable that electricity supply can come to a standstill. Again, there will be a great opportunity for the makers of electric vehicles in this country, for all means of transportation will inevitably be at a premium owing to the hostilities."

Business as Usual

In *The Electrician* of London on Aug. 14, under the title "Business as Usual," the following appears: "From inquiries which we have made of the principal electrical manufacturing firms and supply houses there is no occasion for uneasiness, nor has there been any unwonted falling off in trade.

"According to accounts from London and provincial electricity undertakings, company and municipal, many of the staff, both electrical and mechanical, are called out, and not a few of the stations may, for a period, be under-manned. Whether or not there will be any serious loss in load through the closing of factories will not be ascertained for some weeks yet, but the probabilities are that loss of a customer in one district will be followed by a gain from factories on overtime or new industries created by the war."

MR. SUNNY ON THE BUSINESS OUTLOOK

Chicago Telephone Official Sees Obstacles to Development Unless the Government Is More Tolerant

Mr. B. E. Sunny is president of the Chicago Telephone Company, the Wisconsin Telephone Company, the Cleveland Telephone Company and the Michigan State Telephone Company. He is also a director of the General Electric Company and of some of the transportation companies and banks of Chicago. To a representative of the *Electrical World* who asked him, on Aug. 19, for his opinion of the present business situation, Mr. Sunny said that the telephone business is holding up pretty well under the present abnormal conditions due to the business uncertainty in this country resulting from the European war. The telephone toll traffic has been affected more than the local traffic, and it is not apprehended that the latter will be seriously curtailed. However, utility companies of all classes are making very few extensions at the present time. There will be difficulties, perhaps, in financing new issues of securities by public service companies while the present unsettled conditions exist in the financial centers of the world.

In relation to the movement having for its object the encouragement of foreign trade in the South American countries, Mr. Sunny said that, while the idea is of course a splendid one, it will be difficult, if not impossible, to accomplish anything along that line unless there is an immediate and radical change in the views of the public in respect to subsidizing a merchant marine service, as is done by England, Germany and France, and, furthermore, unless there is a more tolerant attitude by the government toward the men who have had the courage in the past to embark in big enterprises.

"Congress cannot mercilessly hammer the so-called 'captains of industry,'" said Mr. Sunny, "and expect them to come up smiling and ask for more. My observation is that they have quit and that we shall miss their help for many a long day."

PUBLIC SERVICE COMMISSION NEWS

Ohio Commission

Mr. J. Walter Wright, city solicitor of Bucyrus, filed a brief with the commission last week in the rate case of the Bucyrus Light, Heat & Power Company. He asserts that a public service corporation is not entitled to a fixed or definite return on its investment. The interests of the consumers are to be considered first, he argues, and a utility company has not the right to plead to the commission that it is entitled to any certain return until the rates are actually reduced.

Mr. Wright also argues that in fixing the rate the commission should take into consideration the probable increase in business which the reduced rate would naturally bring to the company. If depreciation is greater than it should have been because of the selection of poor apparatus, Mr. Wright argues that the bill should not be paid by the people through the maintenance of high rates. The commission, he says, should investigate the company's business in order to determine the earnings after the ordinance goes into effect.

Missouri Commission

The Missouri Public Service Commission denied the request of the Kirksville Light, Power & Ice Company for a re-hearing of the decision in the electrical rate case which was mentioned in these columns on July 4, 1914. In compliance with the law of Missouri the company was required to put the new rates into effect on the date fixed by the commission. The company, however, had time to take action through the court and to protect itself in that way if the new rate should be lower than will provide a return. It is expected that the company will file a motion with the Circuit Court which will allow it to take up the matter later.

Nevada Commission

The third annual report of the Public Service Commission of Nevada, covering the year 1913, says that the case against the Nevada-California Power Company is by far the most important with which the commission was called upon to deal during the year. The value of the power company's property used in the service of furnishing light and power, according to the company's own evidence, is something more than $5,000,000, while, apart from the testimony, the company itself gives to its property an estimated valuation of approximately $8,000,000.

The commission was divided upon the subject of water-right valuation, Commissioner Shaughnessy adopting the view that no value whatever should be attached to the company's water rights. With this view the majority of the commission could not agree. But in the conclusions reached as to what would be just and reasonable rates under all the circumstances and conditions connected with the operations of this company in the district which it served there was no material difference of opinion, and the order as made met the approval of the entire commission.

The report says, in reference to the work of the commission, that, in order to justify the permanent maintenance of the commission, it is not necessary to anticipate a continued and heavy cutting of rates. There is a line of reduction that cannot and ought not be crossed if the commission has the principles of justice and the best interests of Nevada at heart. If it crosses the line of confiscation, any court in which the orders are contested will hold them to be void. But it should not be the policy of the commission to go anywhere near the line of confiscation, because if it does it will very seriously check the investment of capital in public utilities and greatly retard the progress and prosperity of the State. What in business and social life are regarded and spoken of as "modern improvements" result almost, if not quite, in their entirety from the operations of public utilities. While at all times endeavoring to bring about proper readjustments both of rates and service rendered by these utilities, the commission must also be careful not to become so drastic as to alarm capital, and thus seriously check, if not entirely stop, the investment of money in those enterprises that are so essential to the progressive commercial development of the State.

If it should so happen that the commission never makes another reduction in rates, which is not at all likely, it would still be the height of unwisdom to dispense with the commission. The correctness of this statement will be clearly apparent when it is considered that if the commission were to go out of existence to-morrow there would be nothing to prevent public utilities over which it has jurisdiction from immediately restoring the old rates or even making them higher in order to recoup the losses they have sustained by the reductions to which they have been subjected. The courts are powerless to establish reasonable rates. The Legislature has power to prescribe rates to be charged by all public utilities, but experience has shown that it is neither wise nor effective to attempt to regulate utilities through arbitrary, non-elastic statutes which may be held valid with respect to some utilities and void with reference to others, or void *in toto*. Regulation through commissions, which are administrative boards armed with certain judicial powers, has been found to be the only just and effective method of regulating those individuals, companies and corporations that are engaged in rendering service to the public.

Wisconsin Commission

In our issue of July 18 there was abstracted that portion of the annual report of the Wisconsin Railroad Commission giving statistical information regarding the number of cases and complaints and the amount of authorized securities. The following paragraphs present an abstract of the corporate and financial part of the report:

A portion of the report contains a summary of the principal facts relating to the statistical work of the commission and includes a résumé of the development of railroad and utility business during the period covered by the report. The detailed statistical tables and the unit cost tabulations are to constitute a separate section of the annual report and will be completed later. During the year a total of 1136 utilities made reports to the commission as against 1043 for the preceding year. The report of the statistical department shows that at the beginning of the fiscal year ended June 30 last the value of the property and plant of all electric utilities was $36,438,900, or a decrease of 8.75 per cent over the year preceding. The construction during the year increased 15.46 per cent over 1912. The total assets show a decrease of 13.31 per cent. The total operating revenues show an increase of 17.58 per cent, the gross income an increase of 21.98 per cent, and the net income an increase amounting to 30.72 per cent.

The total property of the gas companies at the beginning of the year showed an increase of 8.99 per cent over the year preceding, the total operating revenues an increase of 8.99 per cent, and the net income an increase of 13.89 per cent.

In the case of the telephone companies the construction during the year showed a decrease of 10.46 per cent over 1912. The total operating revenues increased 9.53 per cent and the net income 14.36 per cent.

Current News Notes

INDUSTRIAL EXPOSITION AT NEWARK, N. J.—The annual exposition of Newark's arts and industries will be held in the First Regiment Armory at Newark, Sept. 12 to 16.

* * *

ACCOMMODATING THE WOMEN-FOLKS. — Although most of the customers of the municipal electric-lighting plant at Huron, Ohio, receive service at a flat rate, the management of the plant keeps the station running each Wednesday morning until 11 o'clock. This is done solely for the accommodation of the 125 women of Huron who own electric flatirons.

* * *

DETROIT'S G. A. R. ILLUMINATION.—The Detroit (Mich.) Edison Company will furnish gratis the electricity for lighting the elaborate decorations of the court of honor, the street illuminations and the outlining of public buildings in connection with the forthcoming G. A. R. celebration at Detroit. As a formality the company has taken a contract to supply the energy, the consideration being $1.

* * *

PENALTIES FOR OFFENDING RADIO OPERATORS.—The Department of Commerce is penalizing commercial radio operators whom it discovers to be violating the regulations governing the service. The Secretary of Commerce has, for example, just suspended for six months the commercial first-grade license held by a ship operator as a penalty for his sleeping on duty at sea and subsequently denying that he was asleep.

* * *

THE PUNKAH-WALLAHS OF IND.—In the electrified cities of India the electric fan is fast displacing the immemorial punkah, and the punkah-wallahs—Hindoo servants who tirelessly work the huge native fans for a monthly wage of $2.60—have been forced to seek other, even if less lucrative, employment. Thousands of electric fans are already in use by both British residents and well-to-do natives to palliate the fierce heat of the tropics.

* * *

UNDERGROUND CONSTRUCTION "RUNS INTO MONEY." —A recent computation puts the total of the conduit owned by the Commonwealth Edison Company of Chicago at 18,961,333 duct-feet. The company's investment in conduit (including tunnels), cable, services, etc., is about $19,000,000, or about 22 per cent of the total assets of the company. The amount of conduit installed by the company in 1913 was about 1,500,000 duct-feet.

* * *

ELECTRICALLY HEATED AIR SPRAY FOR APPLYING VARNISH.—The application of varnish by means of an air spray has been made practicable recently by inserting an electric heater in the compressed-air supply line to prevent the varnish stiffening and turning white when it strikes the surface being coated. By heating the air the varnish is caused to flow more freely through the orifices of the "air brush" and the varnished surface dries more quickly and smoothly than in the presence of cold air. An electric exhaust fan may be employed to remove fumes from the varnishing cabinet.

* * *

THE VEHICLE INVESTMENT IN PARCEL DELIVERY.—In the list of investments of the express companies reporting to the Interstate Commerce Commission horses make up the largest single item of classified cost next to real estate and buildings. For the year 1911 the thirteen express companies reporting had invested in horses $2,938,009, compared with $2,772,330 in vehicles. This was an increase of $217,000 over the investment in horseflesh for the preceding year, despite the fact that the electric automobile was then just coming into use as a means of conveyance for parcel delivery.

* * *

ISTHMIAN TRANSMISSION LINE NEARING COMPLETION. The foundations for the last of the standard track-span bridges to support the 44,000-volt transmission line across the Isthmus of Panama Canal Zone were completed during July, and the steel towers are now being erected. There will be 827 of these standard bridges, besides several special crossing towers of extra height which will support the conductors 78 ft. above the ground, in contrast with the standard height, 30 ft. Each of the special bridges will weigh about 17 tons and cost $1,500.

* * *

A MESSAGE TO MOY KEE.—The Society for Electrical Development has under preparation a post card in Chinese, which members may mail to Chinese laundrymen within their territories, setting forth the uses of electrical devices in laundries. Names and addresses received in reply will be forwarded to central stations, manufacturers and dealers. The society is also sending its central-station members printed matter and suggestions for rendering assistance to real-estate agents in the renting of wired houses. Following its booklet "Vacation Comforts," other literature will be issued on the subject of dry-goods-store window dressing and electrical home conveniences and toilet accessories.

* * *

ELECTRICAL SAFETY RULES.—The Bureau of Standards, Washington, D. C., has issued an important compilation of "Safety Rules" to be observed in the operation and maintenance of electrical equipment and lines. General suggestions are addressed to both employers and employees, and plans of safety organization for corporations are outlined. Protective devices and methods are described and recommended, and detailed instructions are offered for the operation of power plants, overhead lines, switchboards, arc-lighting systems, signal lines, etc. Another set of rules covering the requirements of construction, installation and maintenance work will be issued later. Copies of the newly published book of "Safety Rules" may be obtained from the Government Printing Office, Washington, at 15 cents per copy.

* * *

A MILLION AND A HALF AUTOMOBILES.—Figures compiled by *Automobile* show a total of 1,548,350 automobiles, gasoline and electric, in use in the United States on July 1, an increase of about 250,000 since the first of the year. New York State leads with 140,635 cars, and Illinois comes next with 115,000. Among the states whose registration lists permit the separation of the statistics for gasoline and electric vehicles, Pennsylvania is reported to have 7455 electric passenger cars and 2461 electric trucks, New York 7000 electric cars and 2992 trucks, Indiana 1000 passenger cars and 500 trucks, Massachusetts 823 cars and 695 trucks, the District of Columbia 710 cars and 90 trucks, and Connecticut 400 cars and 200 trucks. In the sixteen states thus reporting separate gasoline-car and electric-car statistics the electric passenger cars numbered 18,055 against 508,673 gasoline machines, and the electric trucks 7086 against 31,556 gasoline trucks.

Four-Hundred-Mile Transmission Completed.—With the closure of the tie-line switch at San Bernardino, Cal., on Aug. 13, energy was transmitted from Bishop Creek to El Centro, Cal., a distance of 400 miles, completing the longest transmission circuit in the world. The new line brings electric service into the Imperial and Coachella valleys.

* * *

Day Service for Venezuela's Capital.—After many false reports it now seems certain that Caracas, Venezuela, is at last to receive daytime service. Energy is furnished by the Venezuela Electric Light Company, which has no competition in supplying lighting service in Caracas. A field for the use of electric fans and household appliances is thus opened up in the Venezuelan capital.

* * *

Lighting the Way to Sales.—Saturday afternoons and Sundays are notably "real-estate days," for most home-seekers are employed during the rest of the week. To reduce the extraordinary activity of the week-end daylight hours and to encourage prospective customers to call during the evenings, a Los Angeles real-estate firm has mounted a searchlamp on a platform overlooking its suburban development so that any plot in the tract under discussion with a customer can be flooded with light, making inspection as easy as in full daylight.

* * *

SOCIETY MEETINGS.

Boiler Manufacturers' Association.—The annual convention of the American Boiler Manufacturers' Association will be held at the Waldorf-Astoria, New York City, Sept. 1 to 4.

* * *

Colorado Electric Association.—The annual convention of the Colorado Electric Light, Power and Railway Association will be held at Glenwood Springs, Col., Sept. 3 to 5, as recently announced in these pages.

* * *

New England Section, N. E. L. A.—As already noted in these columns, the New England Section of the National Electric Light Association will meet at the Hotel Mathewson, Narragansett Pier, R. I., Sept. 2 to 4.

* * *

Telephone Pioneers of America.—The fourth annual meeting of the Telephone Pioneers of America will be held at the Hotel Jefferson, Richmond, Va., Oct. 29 and 30. Mr. Theodore N. Vail is president, and Mr. H. W. Pope is secretary.

* * *

Indiana Electric Light Association.—The Indiana Electric Light Association will hold its annual convention at Terre Haute, Ind., Sept. 24 and 25. Mr. Thomas Donahue, General Service Company, Lafayette, Ind., is secretary of the association.

* * *

Electric-Vehicle Men at Play.—The second annual outing of the Chicago Section of the Electric Vehicle Association of America and the Chicago Garage Owners' Association was held at Cedar Lake, Ind., on Aug. 12. There were many athletic contests, the garage men winning the two principal events—the baseball game and the tug-of-war.

* * *

Motor Truck Club of America.—The annual convention of the Motor Truck Club of America will be held at Detroit, Mich., Oct. 7, 8, 9 and 10. Mr. W. D. Anderson, of the Anderson Electric Car Company, Detroit, heads the electric-vehicle committee for the meeting. The co-operation of interested electric-vehicle organizations has been invited.

* * *

Institute of Radio Engineers.—At a meeting of the Institute of Radio Engineers to be held at Columbia University, New York City, Wednesday evening, Sept. 2, Mr. David Sarnoff, contract manager of the Marconi Wireless Telegraph Company of America, will present a paper entitled "Radio Traffic." Among the topics to be discussed will be methods of handling radio traffic and the regulations of the London convention, particularly with reference to present commercial wave-length limitations.

* * *

Electrical Topics Before Mining Engineers.—The American Institute of Mining Engineers held its annual convention at Salt Lake City, Utah, Aug. 10 to 14. Several papers dealing with applications of electricity to the mining and ore-treating industries were read and discussed. Among the number was that on "Electrical Fume Precipitation at Garfield," recording experiments made by the Garfield Smelter Company at its smelter at Garfield, Utah. The paper was discussed by Messrs. F. G. Cottrell, E. M. Dunn and Lyman Bradley.

* * *

New York Section, E. V. A.—At a meeting held Aug. 20 a New York Section of the Electric Vehicle Association of America was organized. Following are the officers elected: President, Mr. Harvey Robinson; vice-president, Mr. D. C. Fenner, and secretary, Mr. D. F. Tobias, United Electric Light & Power Company, Irving Place and Fifteenth Street, New York. Executive committee—Messrs. W. C. Andrews, T. C. Martin, S. W. Menefee, F. W. Smith, Nathaniel Platt, C. A. Ward, F. F. Sampson, C. G. Kenworthy and S. G. Thompson.

* * *

Detroit Section, E. V. A.—The Detroit (Mich.) Section of the Electrical Vehicle Association of America has been organized with the following officers: President, Mr. J. W. Brennan, Detroit Edison Company; vice-president, Mr. W. J. Gordon, Century Electric Car Company; secretary and treasurer, Mr. Hal C. Smith, secretary Carl M. Green Company. The officers with the following members comprise the executive committee: Mr. C. M. Torry, Philadelphia Storage Battery Company; Miss Sarah M. Sheridan, sales manager Detroit Edison Company; Mr. A. C. Downing, assistant sales manager Anderson Electric Car Company; Mr. W. H. Conant, manager Gould Storage Battery Company, and Mr. J. C. Aywrs, district manager General Motors Truck Company.

* * *

Electric Club-Jovian Outing Near Chicago.—A party of about 500, men, women and children, enjoyed the very successful joint outing of the Electric Club of Chicago and the Chicago Jovian League at Ravinia Park, Ill., Aug. 20. There were all sorts of athletic events and guessing contests, with valuable prizes. A motion-picture photographer made about 2000 ft. of film, which will be reproduced at fall meetings of the club. The tug-of-war was won by the Electric Club. The ladies' needle-threading race aroused much interest, there being sixty-five entries. The swimming contests were particularly successful. Prizes were awarded, among other things, to the ladies wearing the most attractive bathing costumes. Bowling on the green was another attractive feature. Mr. H. A. Mott was chairman of the general committee.

High-Tension Distribution in Central Texas—I

The 60,000-volt system of the Texas Power & Light Company, linking twenty-three communities and supplying energy for lighting, motors, electric railways, cotton gins, oil mills, cotton mills, water pumping, etc.

BRINGING the benefits of economical centralized generation and the diversity advantages of long-distance transmission and distribution to a large proportion of its 23,000 customers in Texas, the Texas Power & Light Company is now operating 247 miles of 60,000-volt transmission lines in the north central section of the Lone Star State. Standard steel-tower construction, with suspension insulators, characterizes the company's transmission circuits, and all switching, transformer and lightning-arrester equipment is of the outdoor type.

At the present time the Texas Power & Light Company operates in thirty-three Texas communities having an aggregate population of 212,000. Its connected load in lighting aggregates 14,000 kw and in motors 12,401 kw. In addition, it operates 3200 street lamps and sells energy to several interurban railways. This railway load alone amounts to 2300 kw and consumes about 1,300,000 kw-hr. each month. Cotton gins, oil mills, cotton mills, city water pumping and railroad shops make up the principal classes of its industrial customers, while the company has one user, a cement plant, which, with a connected load of 3500 kw in motors, consumes 2,500,000 kw-hr. per month.

The Transmission District

The majority of the thirty-three communities now served by the Texas Power & Light Company lie quite close together geographically, and already some twenty-three of them have been linked by the high-tension lines of the company and compose what is known as its "transmission district." This entire central system is fed with energy from two steam plants at opposite ends of one of the main transmission circuits. The communities outside the present transmission district are now served by individual steam or Diesel-engine plants.

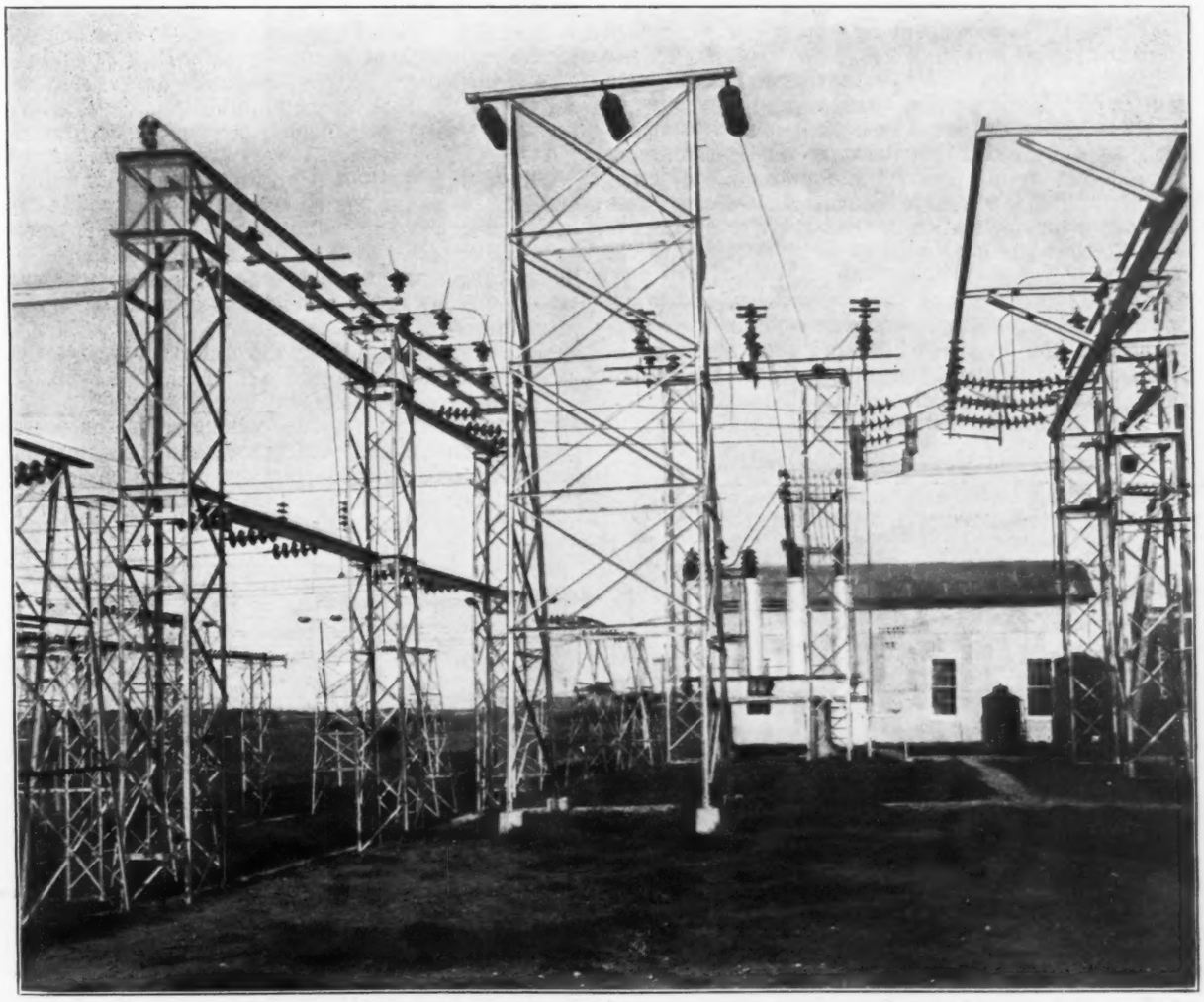


FIG. 1—OUTDOOR TRANSFORMER AND SWITCHING SUBSTATION AT HILLSBORO, TEX.

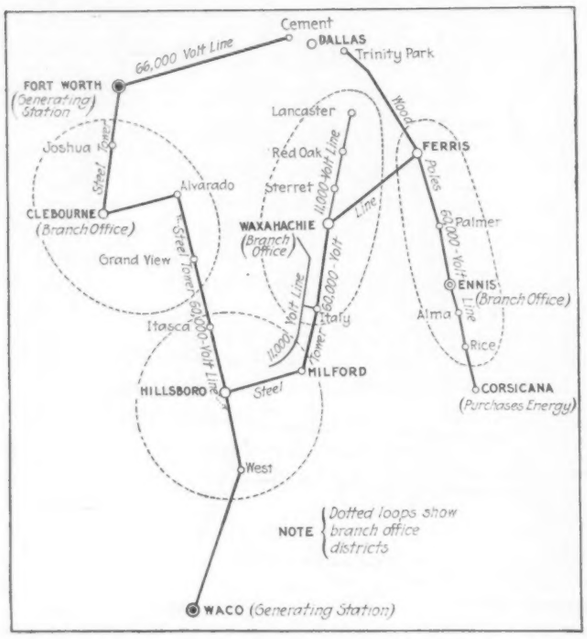


FIG. 2—MAP OF TRANSMISSION DISTRICT, TEXAS POWER & LIGHT COMPANY

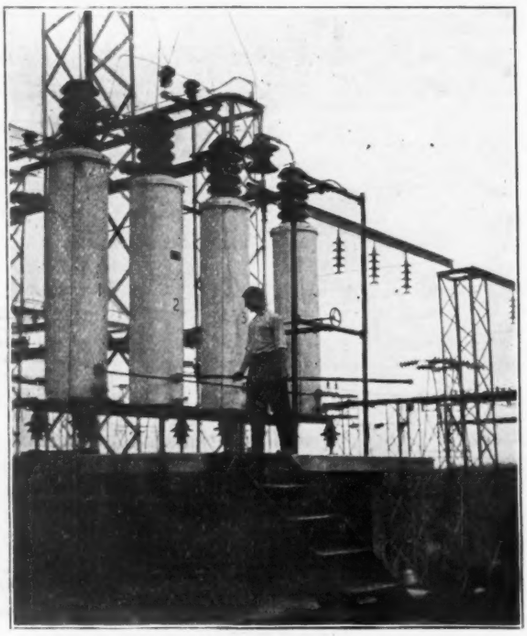


FIG. 4—INSERTING AMMETER TO READ ARRESTER CHARGING CURRENT

but will later doubtless be reached by the high-tension network as this is extended from its present nucleus.

A glance at the accompanying map of the system will afford the reader perhaps a better understanding of the conditions of operation. The company has a steam plant at Waco, the present southernmost extremity of the transmission district. This plant is now being replaced by a modern turbo-alternator station containing two 7500-kva units. The Texas Power & Light Company also purchases a large amount of its energy from the modern turbine station of the Fort Worth Power & Light Company, a description of which appeared in the *Electrical World* of Aug. 22.

From the two stations above mentioned the towns shown on the accompanying map now obtain their electric service, the division of demand upon the two stations for a typical day being illustrated by the accompanying load curves, which indicate the relative inputs into the transmission district.

60,000-Volt Tower-Line Construction

The standard 60,000-volt transmission-line construction of the Texas Power & Light Company utilizes 3000-lb. four-legged steel towers measuring 67 ft. 6 in. above the ground line. These towers are set at intervals of 600 ft., an average of eight or nine being installed per mile. At all turns greater than 5 deg. in the case of the No. 1 conductor lines, and greater than 3 deg. for the No. 0 lines, anchor towers similar to those used for dead-ending at switching structures, etc., are employed. These anchor towers weigh 7500 lb. each. Where the line is carried within the corporate limits of cities or towns the special towers used are of the same height and cross-arm dimensions as the line towers, but are compactly built so that at the base these 3000-lb. structures measure only 3 ft. on a side. All towers are set directly in the ground on steel foundation stubs extending 7 ft. below the surface. The towers for the system were furnished by the American Bridge Company, the Millikan Company and M. H. Treadwell.

The line from Hillsboro to Waco employs No. 0 six-strand conductors; for the remainder of the present transmission system No. 1 three-strand conductors have been used. These conductors are carried on four-disk suspension-type insulators. On the outdoor-substation structures five-disk insulators are used. On the double-

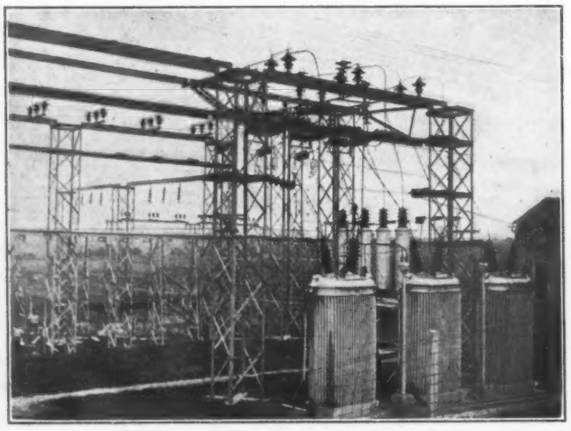


FIG. 3—TRANSFORMERS AND LIGHTNING ARRESTERS AT HILLSBORO

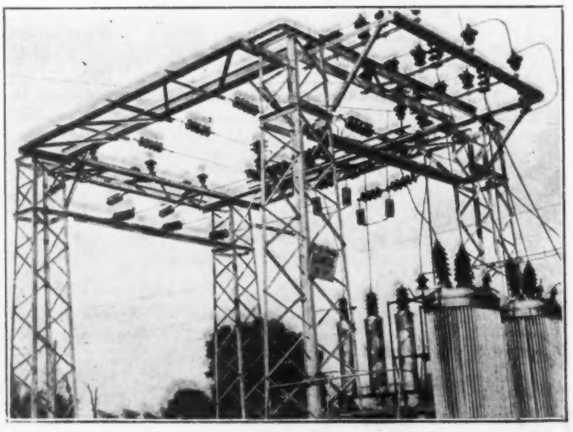


FIG. 5—OUTDOOR TRANSFORMER SUBSTATION AT CORSICANA

circuit transmission towers the wires of each circuit are arranged at 8-ft. intervals in a vertical plane and at a horizontal distance of 12 ft. from the conductors of the

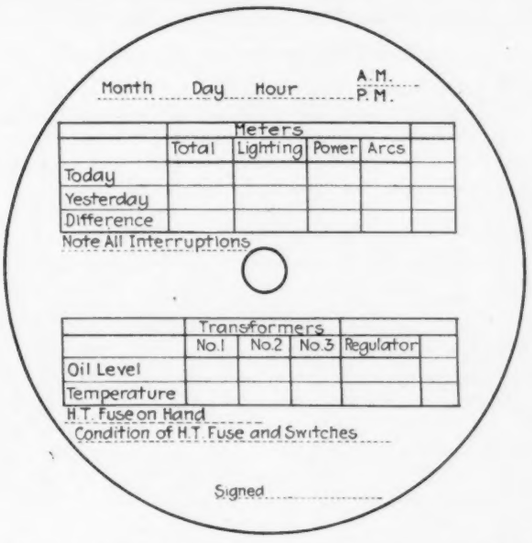


FIG. 6—STATION RECORD ON BACK OF VOLTMETER CHART

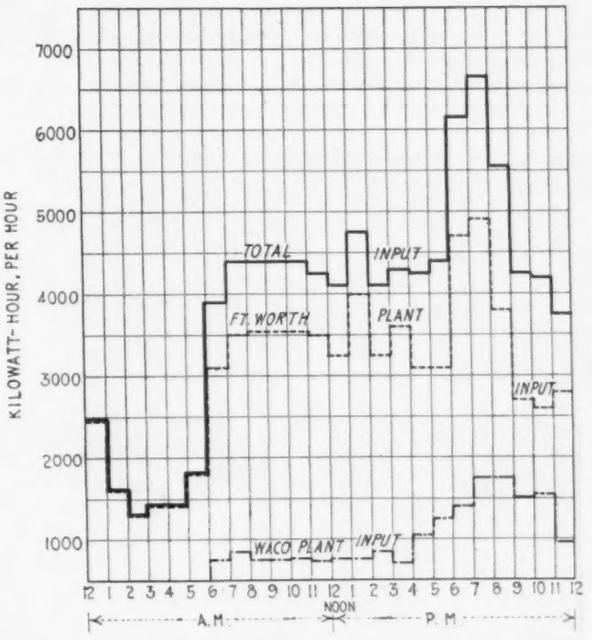


FIG. 10—INPUT TO TRANSMISSION SYSTEM, JAN. 3, 1914

other circuit. At railroad crossings the towers on each side have the customary single insulators replaced by pairs of insulators hung from equalizer yokes, thus increasing the margin of protection against falling conductors. On turns the jumpers connecting the dead-ended line conductors are tied firmly in place with extra suspension insulators where any likelihood exists of the jumpers being pulled in toward the tower. Arcing hooks are also being added at strain insulators.

Transpositions are made at special anchor towers, all lines being dead-ended at such transposition towers with strain insulators. Jumpers are then used to cross-

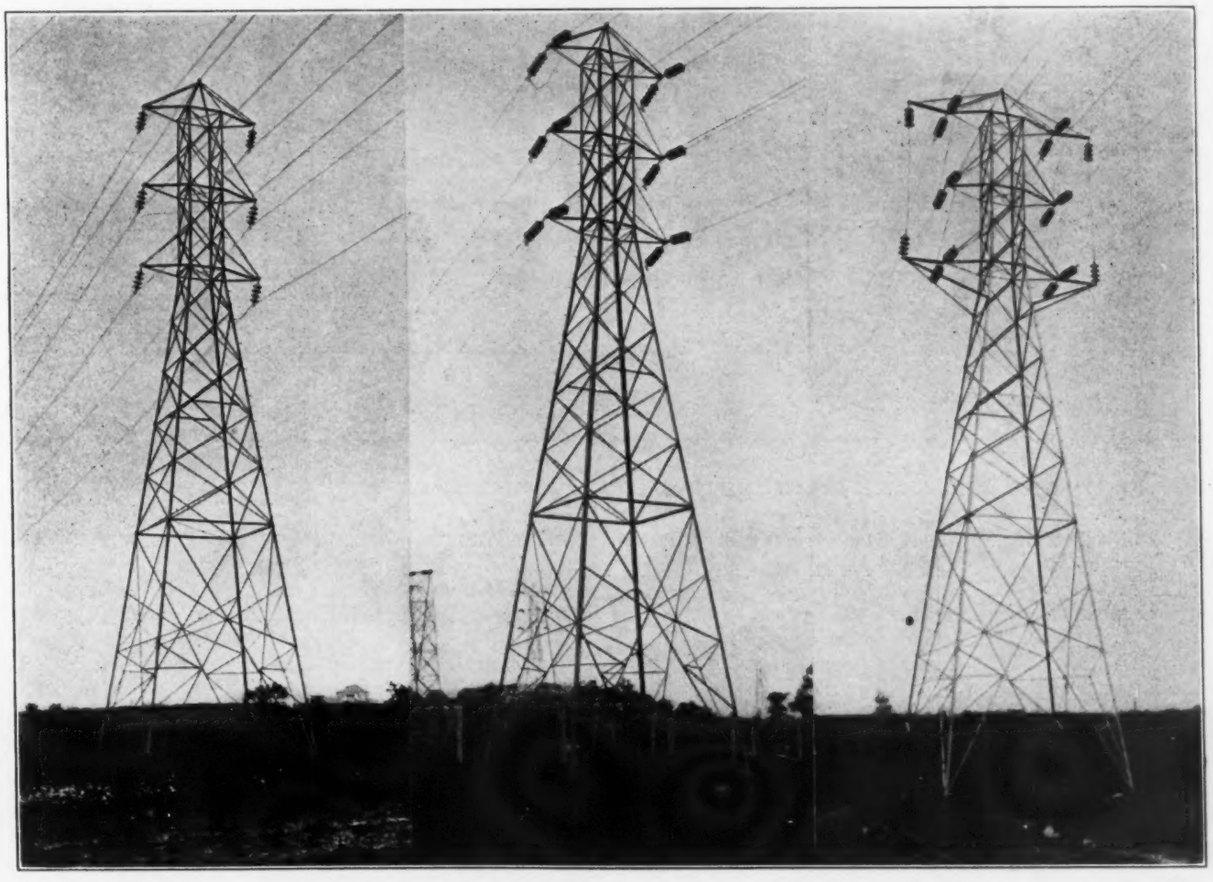


FIG. 7—STANDARD TOWER WITH SUSPENSION INSULATORS

FIG. 8—ANCHOR TOWER WITH STRAIN INSULATORS

FIG. 9—TRANSPOSITION TOWER, SHOWING JUMPERS

connect each incoming conductor to the outgoing wire on the cross-arm above it. The remaining top and bottom conductors are linked by a vertical connection carried between two strings of insulators mounted on special extensions which overhang the regular cross-arms. The circuits are given a complete rotation approximately once in every 30 miles. Locke, Thomas and Ohio Brass insulators are used.

For protection against lightning the line conductors are surmounted by a ground-wire of ⅜-in. Siemens-Martin seven-strand cable, which is carried on the peaks of the steel towers. Throughout most of their length the transmission lines of the company parallel the tracks of the Southern Traction Company, which purchases from the power company the energy supply for its 1200-volt trolley. The towers are usually erected 30 ft. from the center line of the interurban railway tracks, except where detours are made to pass around cities and towns through which the railway runs.

The towers were shipped to Texas in bundles of parts, and all erection work was done on the job. One erecting crew was able to average setting ten towers a day, although under particularly favorable conditions this gang erected twenty-three towers in a single day. Three assembling gangs were required to put the towers together as rapidly as one field crew could erect them in place. Wire was strung at the rate of a mile a day. Sag allowances were corrected for temperature and checked with dynamometer readings.

The 60,000-volt line from Dallas to Corsicana consists of a single circuit of No. 1 conductor carried on 55-ft. creosoted wooden poles, set at intervals of 300 ft. These poles also carry the trolley brackets for the traction line which connects Dallas with Corsicana, additional trolley poles being set midway between the combination transmission poles first mentioned.

Outdoor Construction and Tap Stations

All transformer and switching substations on the transmission system are of the outdoor type as regards the high-tension equipment, switches, transformers and lightning arresters being all exposed to the weather. The low-tension switchboard controlling the local feeders is in each case mounted in a galvanized-iron house adjoining the open-air high-tension structure.

For the substations serving the larger communities special attendants are employed, but in most cases these are combination railway substations containing motor-generator sets and the single operator handles both sets of equipment.

The "tap stations" for the smaller towers have no regular attendants, but in each such community the company has a man "on call," usually a local electrician or wireman, who is paid $5 or $10 a month to visit the station for a few minutes each day and to make any switch movements requested by the load dispatcher at Hillsboro. All switches are numbered, making it an easy matter for the dispatcher to give instructions over the telephone for any switching connection desired.

As already noted, the local man is required to visit the tap station at a given hour each day, and while there he charges the aluminum-cell lightning arresters.

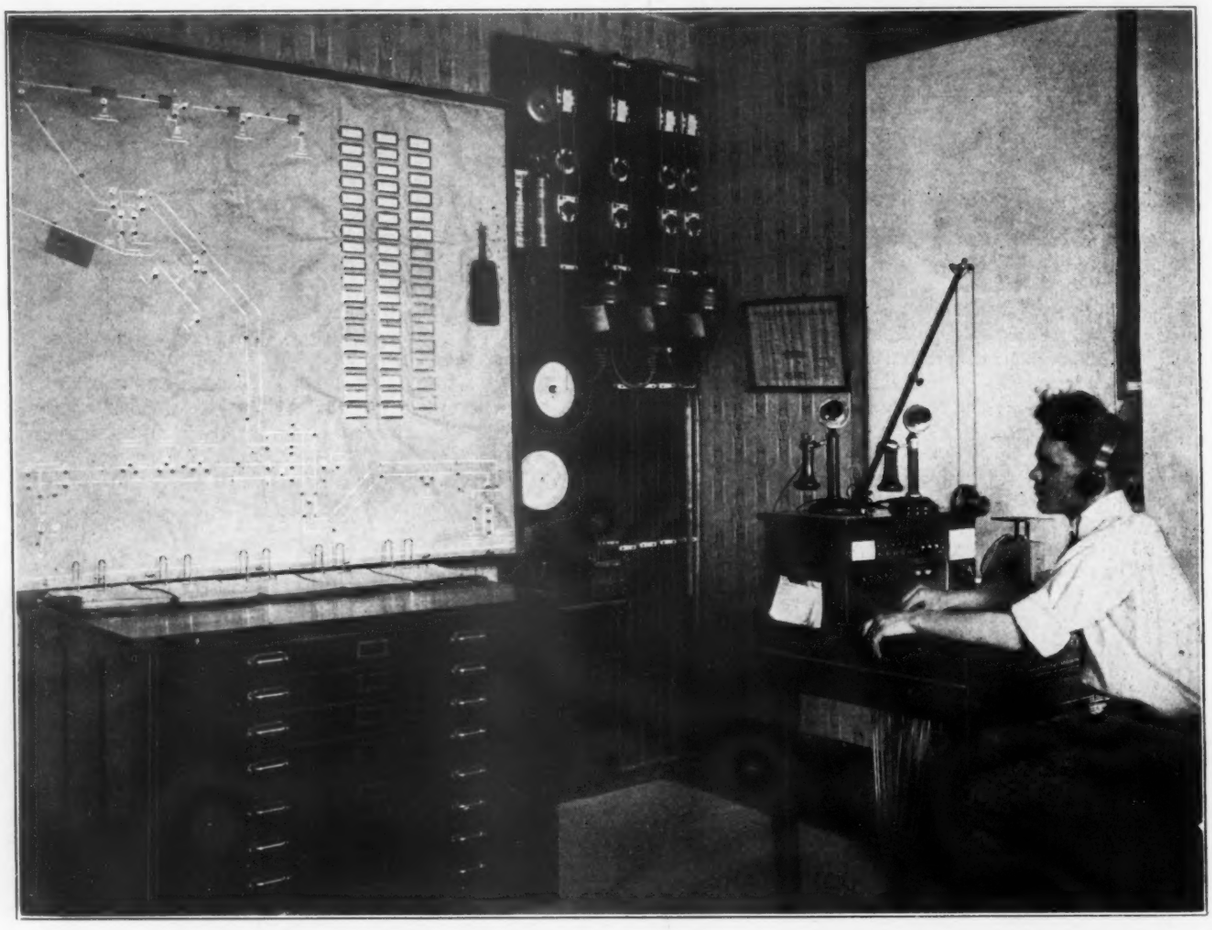


FIG. 11—LOAD DISPATCHER'S OFFICE, HILLSBORO, TEXAS POWER & LIGHT COMPANY TRANSMISSION SYSTEM

notes the temperature and level of the oil in the transformers and regulators, reads the various station kilowatt-hour meters and enters the numerical results in blanks provided on the back of the circular chart which he removes from the curve-drawing voltmeter. This

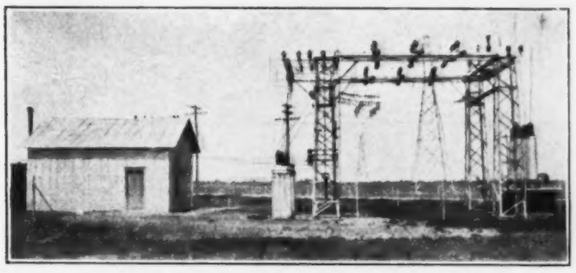


FIG. 12—SMALL-TOWN TAP STATION

record, which is promptly mailed in to the superintendent of power, thus presents a complete report of the preceding day's operation at that tap station.

In the smaller stations the low-tension switchboard panel comprises a totalizing or transformer panel, a lighting panel and a motor-service panel. The motor and lighting circuits are kept entirely separate, and all lighting circuits are provided with automatic induction regulators. The 2300-volt oil switches are mounted on a separate structure several feet behind the switchboard, an arrangement of pull-rods and bell-cranks serving to connect the switches with their lever arms, at the same time affording free passage between the board and switch structure. The switches are equipped with inverse-time-limit relays.

To facilitate instrument readings, all switchboard-type ammeters on the Texas Power & Light Company's system have cases finished in black, all voltmeters are nickeled, and all wattmeters have coverings of polished copper. As this practice is standard throughout the system the men learn to be guided by it and can locate and read the desired instruments easily, even in unfamiliar stations.

Each switchhouse is also equipped with a metal-inclosed lighting cabinet which contains the switches for the station and yard lighting, the alarm-bell circuits, the regulator motors, etc.

Use of Air-Break Switches

Air-break switches of the Pacific Electric type are provided at all high-tension switching points, includ-

FIG. 13—OPENING A 60,000-VOLT AIR-BREAK SWITCH

ing the small tap stations, although the larger switching stations are also now being equipped with 60,000-volt oil switches in series with the air-break switches. The air switches have centrally pivoted horizontal blades which swing into contact with the terminal clips, giving a double break on opening. The current-carrying contact blade is the first to leave its clips, and an instant later the movable member of the horn-gap (which in its closed position is swung clear past its mate) effects the final rupture of the circuit. This

FIG. 14—INTERIOR OF WAXAHACHIE SUBSTATION

improved arrangement does away with the former spring mounting of the horn-gap member. The switches are hand-operated with removable wooden lever handles. Each switch is plainly numbered at its operating position, and at night the yard is well lighted by tungsten lamps mounted on the steel bus structure. Each substation yard is of course inclosed by a strong wire fence with substantial concrete or iron posts.

The lightning arresters are of the General Electric aluminum-cell type and are mounted on concrete platforms which bring their bases 4 ft. above the ground. They are connected in series with resistances which limit the flow of charging current. Every arrester cell on the system is charged at least once a day, as already noted. Each Monday morning the attendant is required to insert the long-handled ammeter provided (see Fig. 4) into the ground-clips of the arrester group and to read the flow to ground. If the charging current taken exceeds 4 amp per cell, he immediately telephones the load dispatcher for instructions relating to the more frequent charging of the cell.

The transformers are of the outdoor, oil-insulated, self-cooling type. The three 400-kw General Electric units at Hillsboro are well shown in Fig. 3. They are provided with disconnecting switches, and in their main leads are inserted both fuses and choke coils, the latter formed by linking the ends of two open helices dropped from the conductor dead-ends to a strain insulator. The transformers are mounted on a low concrete platform and the 2300-volt leads are carried in underground conduit to the switch house.

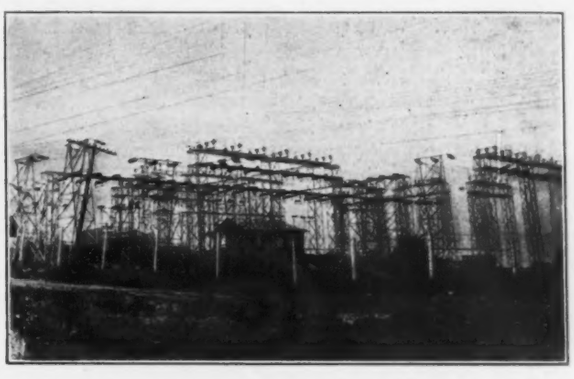


FIG. 15—OUTDOOR STRUCTURE, HILLSBORO SUBSTATION

Pipes are in place so that the oil can be withdrawn from any transformer tank or lightning-arrester cell to be delivered to storage tanks at one side of the yard, or passed through the filter. The oil in each transformer is tested regularly every three months and is

required to show ability to withstand a breakdown pressure of at least 45,000 volts.

All steel structures on which station high-tension buses are carried are foundationed in concrete. The construction is substantial, 0.25-in. by 2.5-in. angles being employed for all main members and 0.1875-in. by 1.25-in. angles being utilized for cross-bracing members.

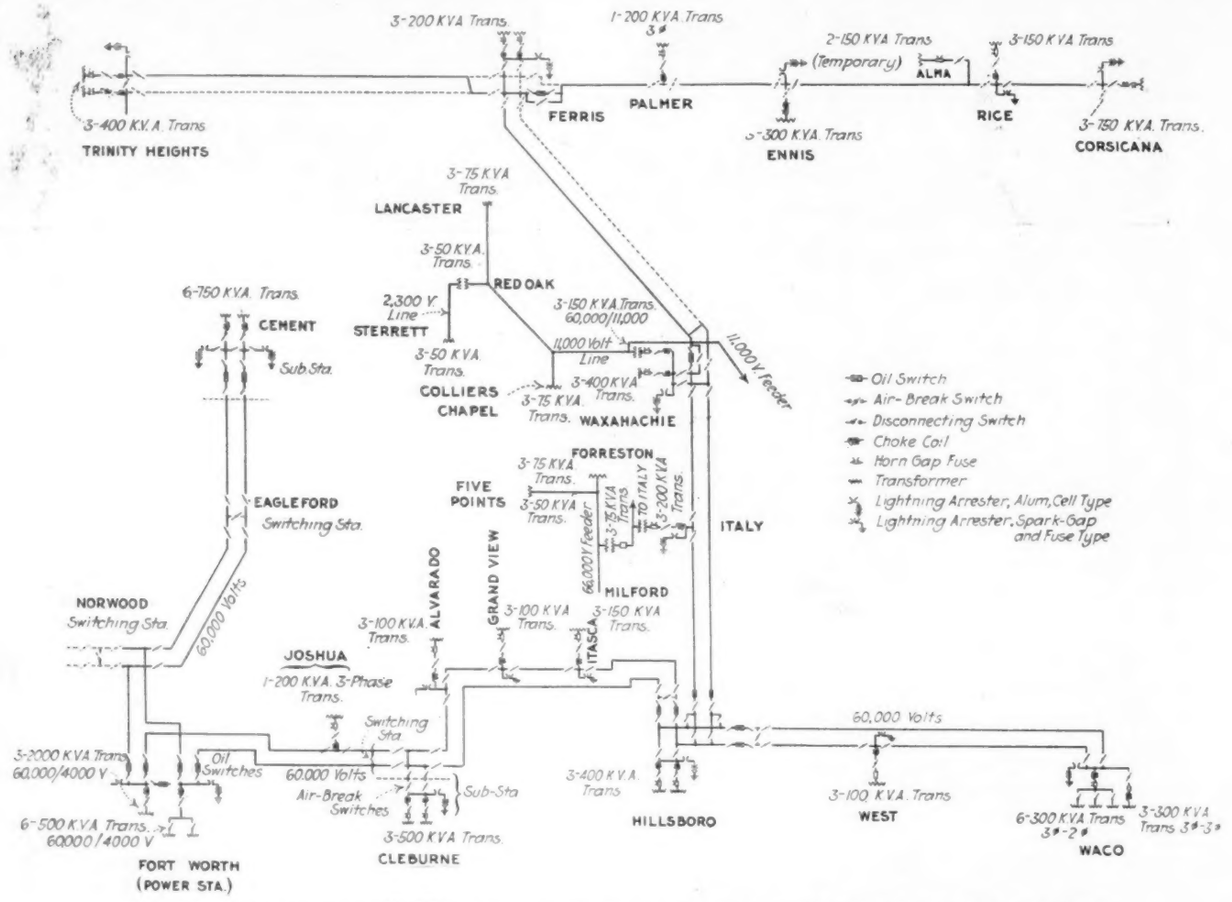


FIG. 16—MAP OF THE 60,000-VOLT TRANSMISSION SYSTEM, TEXAS POWER & LIGHT COMPANY

The load dispatcher of the transmission system is stationed at Hillsboro, where he is provided with telephone connections to all stations and to the Bell and independent exchanges. Before him is a large map showing the lines and the condition of every switch on the transmission system, red tacks being used to mark "live" circuits. The dispatcher issues orders for all switching operations, and also instructs the operators of the steam plants at Fort Worth and Waco concerning the proportion of the system's load each is to pull, depending upon local conditions.

With the scheme of numbered switches employed, the dispatcher's instructions become easy for even the part-time small-town attendant to carry out. All even numbers relate to air-break or oil switches; odd numbers refer to disconnect blade-type switches. The substation operator is required to send in a written report of all switching operations or switch changes made by him on order of the dispatcher.

He must also fill out daily a blank showing the position of each switch in his station. The supplementary report is useful for "checking" and for making sure that the dispatcher's record shall show at all times the exact position of every switch connected with the entire system.

The power company has its own private telephone lines communicating with every station on the system. These telephone circuits are not carried on the tower-line structures but on separate wooden poles, in order that possible transmission-line troubles may not affect also the means of communication. All telephone instruments are protected by means of insulating transformers.

The second and concluding section of this article will describe the commercial organization of the company and the sale of energy for operating electric railways, cement mills, cotton gins, oil mills, cotton mills, water-pumping plants, etc.

Municipal Meter Testing in Chicago

Last year a new section was added to the Bureau of Electrical Inspection of the city of Chicago. It is charged with the duty of testing electric meters, particularly watt-hour meters. Tests are made in compliance with a city ordinance which provides, among other things, for an adjustment in the case of overcharge or undercharge where meters are more than 4 per cent fast or slow. In the last six months of the year 1913 262 electricity meters were tested, but only eleven of these tests were on complaint, perhaps because the service has not become well known to the public. Results of the tests showed twelve meters slow and twelve fast, or 4.8 per cent in each case, 90.4 per cent of the meters tested being found accurate. Of the ones tested on complaint, none was slow, two were fast, and nine were accurate.

A New Marconi Transatlantic Service

Radiotelegraphic transmission between the coasts of Wales and New Jersey soon to be undertaken—Brief history of the progress of "wireless." By John L. Hogan, Jr.

FOR many years it has been possible to signal between America and Europe by wireless telegraphy at night in cool weather. Marconi's experiments in this direction first gave encouragement late in 1901, when the transmission of repetitions of the letter "S" was announced. Ever since that time skeptics have insisted that only atmospherics in groups of three dots were heard, but in view of the use of high balloon-supported aerials and the delicate iron-mercury-carbon microphone there would appear no good reason to disbelieve that in December, when conditions were especially favorable, occasional "S's" might have been received at St. John's, Newfoundland, from Poldhu. It was easily recognized that regular transmission was a forlorn hope with the small-powered senders and the receivers then used, so the transmitter at Poldhu was enlarged and, in December, 1903, another attempt was made to signal over the 1800 miles to Nova Scotia. This time it was stated that complete messages were transmitted. Meantime a sending station was erected on this side of the Atlantic, in Cape Breton, and in 1903 the two plants were able to exchange messages at night under favorable conditions. Commercial service could not be instituted, however, because daylight transmission was still impossible and even the night working could not be relied upon in times of atmospheric disturbance. This condition held for the four years following, until 1907, for the Marconi stations in Canada and Great Britain.

In 1905 Fessenden erected 400-ft. towers and installed apparatus at Brant Rock, Mass., and at Machrihanish, on the west coast of Scotland, 3000 miles away. By using musical sparks of a clear, definitely pitched tone he was able to overcome much of the difficulty caused by atmospherics or "static," and almost at once succeeded in transmitting complete messages in both directions. This marked the first continuous radio communication between the United States and Europe, and it is worthy of note that to this date, some eight years later, no regular daylight service has been established between that continent and the United States. Fessenden's early experiments were on a commercial scale and were successful as regards night transmission, but telegraphing by day was found impossible with the powers available. Enlargement and further increases in efficiency, including the adoption of longer wave-lengths (in accordance with Fessenden's discovery that low wave frequencies were less affected by the change from darkness to daylight), were in progress when a storm blew down the Machrihanish tower. Thus a defect in a guy joint put to an end the most promising long-distance wireless transmission of the time, for thereafter it proved impossible to secure government concessions on terms which would warrant the investment required. The Massachusetts tower is still standing and the plant there has been increased in power. At the present time its installation is practically a duplicate of that at the Arlington high-powered station of the Navy Department[1], and in 1910 it was used as the shore station, with the United States cruisers *Salem* and *Birmingham*, in the long-distance tests of which the results are well known to radio engineers.[2]

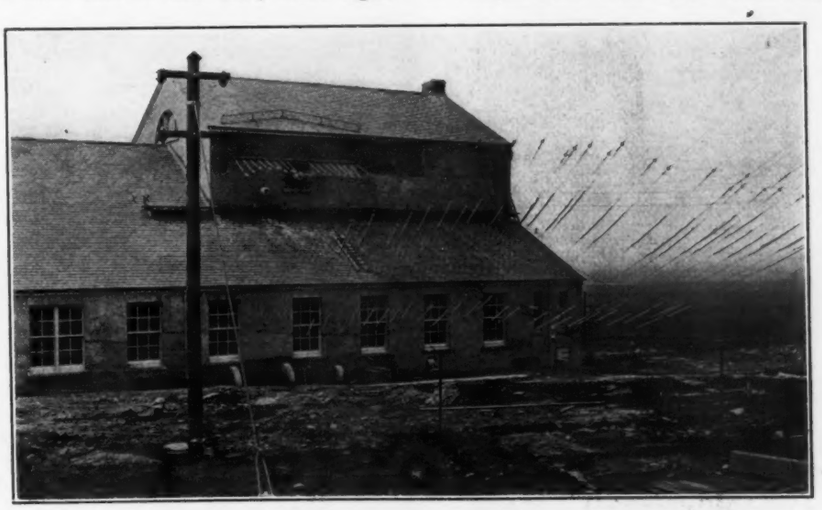


FIG. 1—CARNAVON STATION BUILDING. SHOWING AERIAL AND GROUND LEADS

Radiotelegraphy Enters Commercial Field

In October, 1907, Marconi completed the erection and experimental work upon powerful installations at Glace Bay, Nova Scotia, and Clifden, Ireland, and a limited transatlantic service between these points was opened to the public. This was the first time that radiotelegraphy entered into direct commercial competition with the Atlantic cables. The radio service was made reasonably reliable even in daylight by the use of long waves (from 5000 m to 7000 m) and musical sparks, and, although the effective rate of sending was kept below twenty words per minute because of the necessity of repetitions, continuous transmission was maintained. About 1910 a number of changes were made, including the installation of horizontal "directive" antennas at both stations, and the speed of the service was somewhat increased. Within the last year it has been announced that the plants have been duplexed by the erection of receiving stations to operate simultaneously in conjunction with each transmitter, and thus the message-handling ability of the system has been doubled.

The present condition of the Nova Scotia-Ireland link defines the greatest advance in commercial transatlantic radio at this time. With the "duplex" in operation messages may be transmitted by

[1] *Elec. World*, Jan. 18, 1913, and April 5, 1913.

[2] *Bulletin*, Bureau of Standards, Vol. VII., No. 3, pp. 315 to 363.

wire from New York or elsewhere to Glace Bay, and then repeated by radio to the receiving station near Clifden. From there they are distributed by wire to the cities to which they are destined. When in duplex operation, the Clifden station simultaneously collects messages for America on its line connections and relays them by radio to the receiving station near Glace Bay, whence they are distributed by wire. In each case the transmitting station is operated over a short wire line from the receiver near by, so it is evident that the method of traffic handling is closely analogous to that used on the indirect cables.

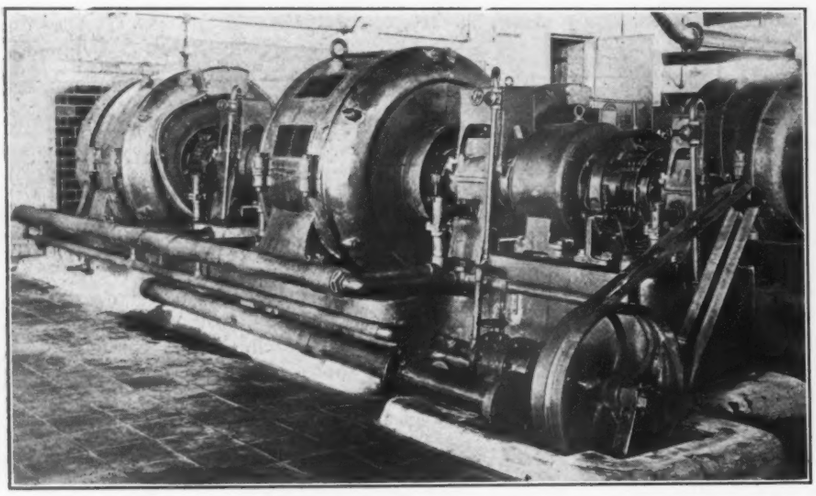


FIG. 2—300-KW, 150-CYCLE MOTOR-GENERATORS

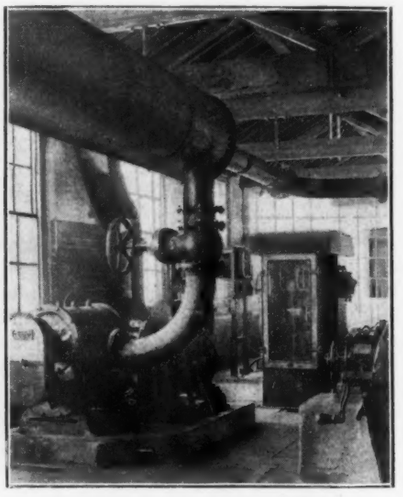


FIG. 4—GEARED MOTOR-DRIVEN BLOWER

Additional Link Soon to Be Ready

The Marconi company is now preparing to provide an additional link of radio service between Great Britain and America. A powerful transmitting station has been erected near Carnavon, Wales, and a receiving and operating plant for duplex working at Towyn, 62 miles away. The corresponding American installations are at New Brunswick and Belmar, N. J., making the communicating distance something over 3000 miles. It is proposed to begin service in the autumn of the current year, at rates less than those charged by the cable companies. Automatic high-speed duplex working is provided for, so that if all expectations are realized it should be possible to transmit fifty words per minute in each direction simultaneously. Since wave-lengths as great as 16,000 m are to be used, there should be no interference with the Glace Bay-Clifden service. Messages collected at New York and London are to be sent by private wire to the controlling stations at Belmar and Towyn, and thence by way of the transmitters at New Brunwick and Carnavon by radio across the Atlantic.

At Carnavon station a horizontal "directive" aerial runs east from the plant for nearly 4000 ft.[3] The wires are supported by ten 400-ft. guyed steel masts, arranged three at each extreme and two at each third-way point of the antenna system, so as to make the average width of the group of wires about 500 ft. The earth connection is made through a large number of buried wires running under the aerial to its far end and two concentric circles of sunken earth plates connected by radial wires and surrounding the station. The central connections by which both aerial and earth wires are led into the station building may be seen in Fig. 1.

The upper floor of the station contains the loading inductances, radio-frequency transformers and oil-insulated condensers. These instruments are combined in the usual way, but are of special construction so as to carry high-frequency currents of 150 amp or more without undue heating. The spark-gaps are of the synchronous rotary type and are installed in sound-proof blower-ventilated chambers on the floor below. Insulated shaft extensions pass through the walls of these rooms from the main motor-generators, as shown in Fig. 2. It will be noted that the entire power plant is installed in duplicate to reduce liability of service interruption.

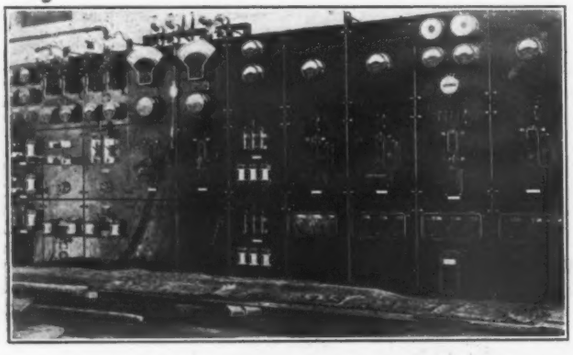


FIG. 3—DISTRIBUTING AND CONTROL PANELS

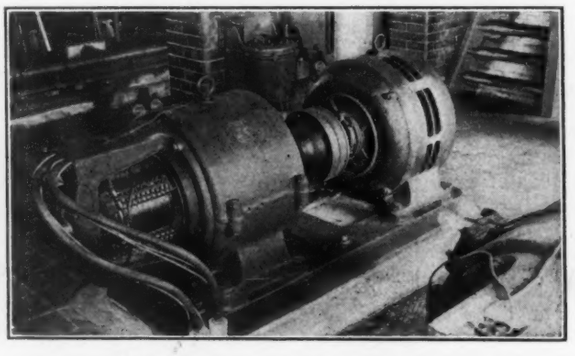


FIG. 5—50-KW A.C. TO D.C. MOTOR-GENERATOR

Electric energy used at the Carnavon plant is gener-

[3]Marconi's Wireless Telegraph Company has furnished many of the technical data relating to the Carnavon and Towyn stations.

ated by hydraulic turbine-driven machinery at Cwn Dyli, and from the public service station there brought 11.5 miles at 10,000 volts, fifty cycles, three-phase, the emf being stepped down to 400 volts. This energy is used for operating the large motor-generators as well as auxiliary machines for ventilation, generation of direct current, etc. Each of the main units, shown in

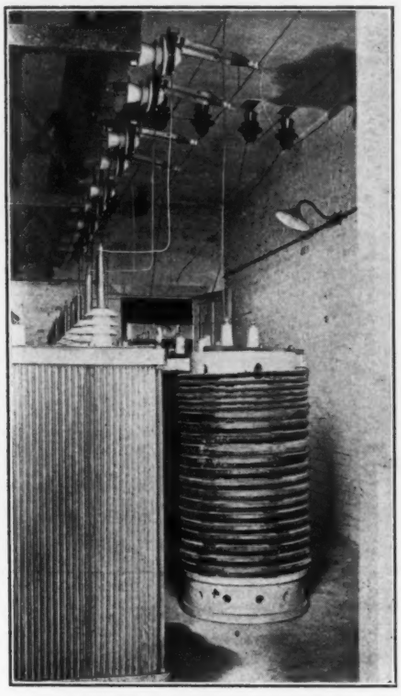


FIG. 6—BANK OF 150-CYCLE POWER TRANSFORMERS

Fig. 2, consists of a 500-hp motor directly connected to a 300-kva, 150-cycle, 1750-volt single-phase alternator and a 12-kw, 40-volt exciter. The synchronous gap is provided with one electrode for each pole of the generator and thus produces normally 300 sparks per second. Should other spark frequencies be required, however, they may be secured by driving the gap from an independent 50-hp, 110-volt motor which is so placed that the rotary disk may easily be connected to it after uncoupling from the shaft of the main motor-generator.

The large switchboard shown in Fig. 3 carries the circuit-breakers, starters, meters and distributing switches for the power apparatus of the entire station. The 50-kw motor-generator of Fig. 5 produces direct current at 110 volts for various uses, such as driving the motors provided for non-synchronous operation of the rotary gaps. Fig. 4 shows one of the geared rotary blowers which is driven by a 440-volt, three-phase motor and supplies air for the relays, etc.

The 150-cycle current produced by the main machines at Carnavon is not of sufficiently high voltage to use in charging the condensers, and hence, after passing through the Morse signaling relays and low-frequency inductances for resonance adjustment, it is led to the power transformers of Fig. 6. These are in five units of 75 kva each and may be connected in as desired by means of the high-potential switches overhead. The secondary terminals of the transformers are led directly to the condensers and rotary gaps. The signaling relays, which make and break the full power of the main transmitter in accordance with dots and dashes of the Morse code, are operated in conjunction with the small triple motor-generators of Fig. 7, and may be controlled either by a hand sending key or, through telegraph relays, by means of an automatic transmitter.

At Carnavon there is also installed a complete receiving station which may be used for simplex operation with the United States in case of damage to the Towyn receiving plant or to the lines connecting it. This necessitates a somewhat elaborate system of remotely controlled and interlocked switches for transfer of aerial connections, grounding of wires not in use, protecting receiving instruments, closing power circuits, signaling to the engineer in charge of the transmitter, etc. All these functions may be performed by the closing of a switch at either the regular duplex receiver at Towyn or the emergency receiving outfit at Carnavon.

In addition to the telegraph and power plants the transmitting station building contains offices, storerooms, a laboratory equipped for such experimental work as may be carried on in a place of this kind, and a machine shop for the repair work which arises from time to time.

System of Duplex Operation

In duplex operation according to the plan to be used in these stations the transmitter remains connected to its own aerial wire system and is kept in continuous operation at some determined wave-length. Simultaneously the receiving apparatus on the same side of the ocean is kept in operation, listening to messages received upon its own antenna at some other wave-length from across the Atlantic. Obviously, means to prevent interference by the local sender must be employed at the receiving station, and nothing will be likely to remove such interference difficulties unless the two local stations are separated by 30 miles or more. The Welsh receiver at Towyn is stationed about 60 miles from the sending plant and has a long receiving antenna supported on a line of five 300-ft. poles which extends from the operating house directly away from the distant American station. This is the position which is best suited to receiving from New Brunswick, and it makes the Towyn aerial wires parallel to those at Carnavon, which relation (taken in connection with the angle formed by the Carnavon wires and a line between the stations) causes the energy picked up from Carnavon by the Towyn aerial to be nearly a minimum. Even by taking advantage of this directional property of horizontal aerials, in addition to the wave-length difference and the 60 or more miles between the stations, it is believed that the signals received from the

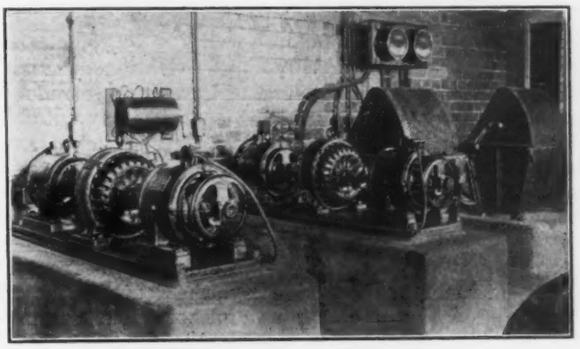


FIG. 7—TRIPLE MOTOR-GENERATORS FOR SIGNALING

Welsh transmitter will be too strong to permit reading messages from America while Carnavon is sending. To overcome this, and so to permit duplex working, a "balancing aerial" 80 ft. high and extending away from Carnavon has been erected at Towyn, and the energy from this (which is directed favorably for collecting signals from Carnavon and unfavorably as regards the

messages from New Brunswick) is reversed in phase by an opposing primary coil in the receiving tuner and used to cancel the interference set up in the main receiving aerial by the operation of Carnavon.

The apparatus at Towyn includes the usual tuning inductors and condensers, with arrangement for use of either the modern crystal or gaseous detectors and amplifiers. Provision is made for automatic receiving at high speeds, up to, say, fifty words per minute, by amplifying the responses to the incoming signals with either microphonic or vacuum relays and using the resulting larger pulsating currents to operate the recorder on a phonograph carrying a rapidly revolving wax cylinder. The cylinders thus filled with signal records at high speeds are to be distributed among a group of deciphering operators who will run them through upon their reproducing phonographs at lower speed and copy off the messages for transmission over the land lines. From Towyn it is proposed to send London messages through by the Creed automatic wire system, in which the London instrument will print in Roman letters upon a tape the telegrams put on the line by the wireless deciphering operator.

All telegraphing, whether for the sender or receiver, will be done at the Towyn operating station. The receiving process has been outlined. Transmitting from London is to be even simpler, for messages received at that place will be perforated on the sending tape and passed through a Creed transmitter. At Towyn a Creed reperforator will produce the identical signals on a second transmitting tape, which is then to be run through a Wheatstone sender connected by wire with Carnavon. Thus by a single handling, as regards Morse, a message will be run through from London and launched into the ether on its way to Belmar. If instead of receiving by ear or recording upon a phonograph it were only possible to utilize incoming wireless signals to operate a perforator, there would be needed no Morse operators to run the entire transatlantic service, for the original transmitting tape might be prepared by a typist upon a keyboard perforator. However, such receivers have been little more than dreamed of as yet, and in fact we have still to see a single radio message exchanged between the United States and Europe under conditions which would warrant confidence in continuation of communication for months or even for days. It is greatly to be hoped that the opening of the New Jersey-Wales installations will inaugurate a transatlantic radio service of permanent commercial value.

Automatic Sidewalk Alarm for Garage Entrance

An element of danger to the pedestrian is introduced by garages and driveways which open directly onto the sidewalk, for whereas in earlier days the clatter of horses' hoofs gave warning of the approach of a team, the silent, powerful travel of an automobile or motor truck affords scant notice of the danger besetting the passer-by.

To protect pedestrians on the sidewalk in front of its establishment at Louisville, Ky., the Southern Motors Company has a combined lamp and bell warning signal mounted over the doorway from which cars are likely to emerge. The lamp labeled "Danger," as shown in the illustration, burns all night long, and by contacts mounted in the floor of the driveway leading to the door a powerful 10-in. bell is rung at the approach of a car. Both the lamp and the alarm bell are carried on a frame which overhangs the sidewalk.

The contact device by means of which the bell is automatically operated consists of a sheet-steel plate, slightly curved so as to spring upward and break the circuit when pressure is removed from its top. This plate, hinged at one side to admit being lifted when necessary, is laid in the concrete floor of the passageway. Measuring 18 in. by 24 in., it is so placed that the wheels of an automobile leaving the garage cannot avoid passing over it. The contact is formed both when

SIDEWALK ALARM SIGNAL AT GARAGE ENTRANCE

the front wheel passes over any part of the plate and again when the rear wheel passes over it. Thus with a long wheelbase two distinct rings of the gong are given. A copper spring beneath the steel plate is pressed against an insulated stationary contact when the weight of a car deflects the plate. This completes the circuit and the gong sounds.

It is interesting to note that at the first tap of the bell every person passing the building invariably halts perceptibly and looks around. Anyone who has not stepped from the sidewalk level to the alley paving checks his progress until he makes sure whether or not a car is coming.

The globe with its warning legend burns all night long, the man at the head of the night shift being held responsible for turning this lamp on when he comes on duty and extinguishing it at daylight.

Typhoons and Philippine Transmission Lines

From June to October of each year the Philippine Islands are subject to typhoons which occasionally interrupt electric service by blowing debris against transmission lines and poles. These whirlwinds are usually very violent and occur without warning, uprooting trees, demolishing houses, sucking up large quantities of water, and sometimes even swamping ships. Because of their vertical, gyratory movement, however, they are not so destructive to transmission lines as equivalent horizontal gusts or gales of wind would be, except when they drop entrained debris on the lines or trail loose branches of trees through the conductors. The Manila Electric Railroad & Light Company reports that these disturbances do little damage to its trolley wires unless loose branches are flying through the air. Ordinarily the typhoons cause about the same interference with operation as would a fairly bad snow and sleet storm in the States.

Central Station Management

Devoted to Discussion of Administrative Policies, Commercial Methods and Current Practice Among Successful Utilities

Labor-Saving Electric Flatirons at Boston

Under the caption "Light Versus Heavy Housekeeping," the Edison Electric Illuminating Company of Boston, Mass., points out the fact that at least 15,000 6-lb. electric laundry flatirons are in use in the company's territory, and that as each of these irons replaces at least three 6-lb. sadirons, the use of the electrical equipment means that 270,000 lb. of old irons have been relegated to cellars, attics and junkheaps. The use of these old irons required on ironing days the expenditure of some 2400 mechanical horse-power in human strength, and on the basis that each electric iron saves its user yearly 200 miles of walking in the beaten path between the ironing board and the range, the irons now in use on the Boston Edison system save the women of Greater Boston a total of 3,000,000 miles of walking annually. The company allows a credit of $1 for any old iron, regardless of its type, toward the cost of a new 6-lb. electric iron, making the latter $2.50 net to the purchaser during the present campaign.

Advertising to New York's Polyglot Population

In the campaign for new business constantly being waged by the New York Edison Company the foreign residents of the metropolis are not overlooked. Besides the many English and the three German dailies, the company advertises in twenty-seven newspapers

"EDISON SERVICE" IN A FEW OF NEW YORK'S MANY TONGUES

printed in foreign languages. These papers reach nearly 1,000,000 readers—Bohemians, Croatians, Frenchmen, Greeks, Hungarians, Italians, Jews, Poles, Russians, Servians, Slovaks, Slovenes and Syrians. In addition the German dailies reach 227,000 readers of the language of the Vaterland.

Milwaukee System of Compensating Electric-Service Salesmen

A new and comprehensive system of compensating salesmen, worked out for the Milwaukee Electric Railway & Light Company more than a year ago, has now been in successful operation for a number of months with results satisfactory to both the salesmen and the company. The object and purpose of the system is to provide a basis by which salesmen will be compensated in proportion to the value of business they produce, and at the same time to differentiate properly between the several classes of business available. In drawing up the plan here described it was recognized that the duties of a salesman are not confined to the mere taking of orders for new and additional service, but that the salesman must, in addition to his regular work of soliciting new business, look after customers' complaints and protect old business.

TABLE I—CREDIT POINTS FOR BUSINESS SECURED

Classification	Business Signed by Salesmen	Business Signed in Office
New customers on existing lines	5	1
New business on extended lines	2	1
Additional business with present customers, lighting	7	1
Additional business with present customers, motor service	3	1
Successor customer	2	1
Renewal of contract	2	0
New commercial customer converted from gas or gasoline	7	1
Old houses wired	11	1
Flat-rate or street-lighting contract	7	0
For each additional dollar of estimated annual revenue on three-year contracts or longer	1	

One of the objections frequently urged against any commission system for compensating salesmen is that such a system invites carelessness on the part of the men in matters wherein the satisfaction derived by old customers is at stake. To compensate the salesman for his work in connection with old customers the plan is accordingly arranged to pay the salesman a fixed salary plus a commission. Payment of such a fixed salary gives the company the first call upon the salesman's time in taking care of the company's existing business. In the practical application of the system the company's territory is divided into districts and each salesman is held strictly accountable for the condition of the business in his district. The business available has been classified, and values, per kilowatt connected, in dollars of estimated annual revenue have been assigned, based upon the company's past experience as to the revenue which the several classes of business may be expected to produce.

The salesman's compensation paid as commission is computed upon the basis of so much per thousand "points," and the value of each class of business, in

points per dollar of estimated annual revenue, is set forth in Table I.

In the application of any system of compensating salesmen wherein a commission is involved, it is necessary to devise some plan for requiring the salesmen automatically to take care of existing business and to be keen against loss of business to competitors, whether gas or electric. The system of compensating salesmen here described has taken this feature into consideration by arranging for debit points to cover losses of business. The application of these debit points is shown in Table II.

The estimated annual revenue upon which the points in Tables I and II apply is based upon the actual number of watts connected, or disconnected, and the productiveness of the various classes of business secured as determined by the company's experience. The salesman has no part in fixing these values.

Appliance-Sale Commissions

As the Milwaukee company, like many other public-service companies, handles motors, rectifiers and other kinds of energy-consuming devices, its plan of compensating salesmen provides for the payment of a commission on the sales of such equipment. The industrious salesman has, therefore, another opportunity to add to his earnings, and the company receives an opportunity to push any particular device by making the commission attractive. Motor-service salesmen, for instance, find but little trouble in securing the customer's order for motors at the time they take the customer's contract for motor service, and lighting salesmen, likewise, frequently are able to sell flatirons, washing machines and other household devices to customers as a mere incident to securing the customer's service contract. In its commercial-engineering work the Milwaukee company frequently has occasion to trade in various types of electrical equipment which are displaced by central-station service. By placing an attractive commission on this traded-in equipment opportunity is often found to sell it to customers of the company. Salesmen, as a rule, much prefer to sell new equipment, but the opportunity afforded to attach an attractive commission to the sale of used apparatus offsets the former tendency.

TABLE II—DEBIT POINTS CHARGED SALESMEN FOR LOSS OF BUSINESS

Disconnection	1
Actual customer lost to competitor	7
Prospective customer lost to gas or gasoline competitor	2
Decreased business	1
Complaint not reported upon by salesman within six days of filing	50
Misrepresenting facts to customers, or failure to report loss of business accurately	100*

*Minimum; no maximum.

Rules Governing Application of the System

Any system of compensation designed to hold the salesman strictly accountable for business gained and lost in his territory must provide for the establishment of a well-defined district in which the salesman is to operate, and, furthermore, his operations must be confined strictly to his own district. By the Milwaukee plan salesmen are credited or charged, as the case may be, with all business developed or lost within their respective districts, with the exception of certain special business which is handled directly by the sales manager or by the commercial-engineering department. It occasionally develops, however, that a certain salesman is particularly fitted to handle a piece of business in another territory, and in case the salesman is so detailed he is compensated for such service under the personal direction of the sales manager. Motor-service salesmen are entitled to assistance to the extent of one call by a commercial engineer, without penalty, and lighting-service salesmen are similarly entitled to advice from the illumination engineers and the district sales agents without penalty. If the business under consideration appears to demand the preparation of an engineering report or to require the assistance of special engineers, the salesman is penalized to the extent of 50 per cent of his normal commission on account of his inability to close the business without such assistance. This arrangement tends to minimize the work which the special engineers or the commercial-engineering department is called upon to do, and is productive in developing self-reliance and resourcefulness on the part of the salesman.

The Value of District Sales Agents

Motor-service salesmen are not credited with lighting business and lighting-service salesmen are not credited with motor-service business except as such business may be incidental to the regular business of the salesmen. This provision is necessary, inasmuch as the districts of the motor-service and lighting-service salesmen must overlap. The territory in which electric service is supplied by the Milwaukee company is divided into several principal divisions, each division being in charge of a district sales agent. For the purpose of keeping the district sales agents keenly alive to every possibility that exists within their districts, and at the same time giving them a contingent interest in the prosperity of the salesmen, a bonus plan has been developed under which the district sales agent participates in the results produced by the salesmen reporting to him, provided that such results are above a predetermined value. The district sales agents are paid a bonus depending upon the ratio of amount paid as commission to the amount of fixed salary plus commission paid within the district sales agent's division. This bonus is in addition to a reasonable fixed salary, and makes the district sales agent thoroughly alive to the importance of eliminating all unproductive salesmen.

Results After Nine Months' Operation

As originally worked out, the system was designed to give the average salesman approximately the same wages he had been receiving. That the plan is beneficial to every one concerned is demonstrated by the fact that no salesman is earning less than his former salary, while the increases in some cases have ranged as high as 90 per cent of the former salary. The increased earnings by salesmen therefore indicate increased efficiency and lower cost of securing business. The system so far has shown good results. It was devised by Mr. James D. Mortimer, president of the North American Company as well as of the Milwaukee company.

Prospective Load in a Town of 250

Uniondale, Ind., 3.5 miles off the right-of-way of the Fort Wayne & Northern Indiana Traction Company, is soon to receive electric service from the 33,000-volt transmission line paralleling the electric railway. A preliminary canvass of the town, which has a population of 250, has produced forty-six lighting contracts as well as motor-service contracts aggregating 100 hp. Among the latter are four comparatively large customers—namely, two grain elevators, one sawmill and one cement mill.

Illumination and Wiring

Modern Illumination for Historic Structure

The grounds about the county court house at Springfield, Ill., were formerly among the darkest spots in the city's business district. Recently, however, ten 20-amp high-efficiency tungsten lamps with compensators have been suspended from brackets at intervals around the building, with the result shown in the illustration

HISTORIC STATE HOUSE AT SPRINGFIELD, ILL., LIGHTED WITH HIGH-EFFICIENCY LAMPS

herewith. The building itself is of historic interest, having served as the Illinois State House in the days when Abraham Lincoln was a practising attorney at Springfield. Since that time, however, the building has been raised and another story added beneath the original structure.

The Meter Basis for Street-Lighting Contracts

At Bessemer, Mich., an unusual form of street-lighting contract has been entered into, which, while providing for the ownership of the street lamps by the city, arranges for the purchase of the necessary electrical energy upon a meter basis from the local central station, the Gogebic & Iron Counties Railway & Light Company, which supplies service to a number of communities in the vicinity. The form of contract is one recommended to the city by its consulting engineer, Mr. J. R. Cravath, of Chicago.

In order to understand the reasons for drawing up the contract in its present form it will be of interest to review briefly the recent history of Bessemer's street lighting. In 1910 a contract was made between the city of Bessemer and the company which then owned the central station providing for the operation of 7.5-amp alternating-current inclosed arc lamps, all night every night, at $87 per lamp per year. Later the electric-lighting property at Bessemer was purchased by the present owners. Early in 1914 dissatisfaction with the street lighting developed locally, much of this being doubtless due to the fact that the neighboring city of Ironwood, which was supplied by the same company, was obtaining 4-amp magnetite arc lamps at a cost of $60 per lamp-year. The Bessemer contract contained the antiquated and much litigated specifications calling for "1200 candle-power." The city called upon Mr. Cravath to make candle-power tests and to advise as to the best course to be pursued.

Mr. Cravath's tests showed that the lamps were hardly up to the candle-power performance which lamps of this kind should average on the streets. The sixteen lamps tested on the street averaged 156 cp as measured at angles between 2 deg. and 10 deg. below the horizontal. Although Mr. Cravath expressed the opinion that the city might have grounds for cancellation of its street-lighting contract because of failure on the part of the company to fulfil its terms, he did not recommend that such radical action be taken. He proposed that instead of starting wasteful litigation a new form of contract be made which would be much more advantageous to the city and which would give Bessemer an up-to-date street-lighting equipment in place of the antiquated inclosed carbon arcs. The company realized the justice of the city's request for better street lighting in return for the money expended, and after some negotiations the new form of contract was put into effect.

Terms of the New Bessemer Street-Lighting Contract

The principal terms of the new street-lighting contract are as follows:

The city agrees to use not less than 98,000 kw-hr. of electrical energy per year for street-lighting purposes, this energy to be delivered at the lamp terminals. This service is to be in the form of sixty-cycle alternating current, maintained constant at 7.5 amp. As a result, the company will not have to change its regulating apparatus, and very few and unimportant changes are necessitated in its series street-lighting circuits. The company is to furnish all poles, wires and other appliances necessary to deliver the electrical energy at the city's lamp terminals. The city is to furnish the lamp fixtures and lamps. The company is to thoroughly clean all lamp globes and reflectors once each month. The city is to furnish the lamps for renewals, but all the labor of maintenance and renewal is to be performed by the company. Electrical energy is to be metered at the company's power plant or substation. Provisions are made for checking the accuracy of the meters by representatives of both the city and company. The city is to pay the company for the service and electrical energy used for street lighting at the rate of 4 cents per kw-hr.

Electrical energy lost in the series street-lighting circuits is to be deducted from the kilowatt-hours for which the city is billed, and for this purpose periodical tests for line loss are provided. With the lamp terminals short-circuited a test will be made to determine the electrical power taken by the circuit with 7.5 amp flowing. The company is to perform the labor of hanging the city's street-lamp brackets and fixtures. The company is to advance or loan to the city sufficient money to purchase new lamps and fixtures in place of the present lamps. Specifications have been drawn up by the city's engineer under which these lamps are to be purchased.

In place of the present seventy-four inclosed carbon-arc lamps, nitrogen-filled tungsten units will be provided as follows: Forty-three 80-cp lamps and thirty-six 250-cp on the business streets; eleven 250-cp lamps for white-way lighting and forty-five 600-cp lamps for other places. The last-named are to be 20-amp lamps with compensators for operation on the 7.5-amp circuit.

Advantages Secured by Both Municipality and Company

The engineer estimates that the cost of electrical energy and lamp renewals for the first two years plus the cost of the fixtures (which are to be paid for in twenty-four equal monthly instalments) will just about equal the city's present street-lighting bill. This form of contract, it is pointed out, is one which is decidedly advantageous both to the city and to the company. It

makes easy for the city a change of street lamps at any time that advancing improvements seem to justify such a change. This can, moreover, be done without the controversy which sometimes accompanies the drawing up of a new contract for street lighting. At the same time the company is relieved of the uncertainties of providing for changes in the street-lighting art on a lamp-year contract basis. On a lamp-year basis the company is obliged either to charge enough to provide for very rapid depreciation of the street-lighting equipment or to insist on a long-time contract, both of which are undesirable from the city's standpoint. The city is exchanging an antiquated street-lighting system for one which gives much more light for the money at a reduced ultimate cost to the city, and according to the engineer's estimate the company's net earnings from street lighting will not be reduced under the new contract. In fact, the old contract was taken as a basis of calculating the kilowatt-hour rate under the new contract because the old contract was in full force and could not be set aside except by the consent of both parties or through a lawsuit.

Another Metered-Basis Contract

The town of Garner, Ia., has recently made a street-lighting contract with the Enterprise Electric Light, Heating & Power Company which seems to be working out well for all concerned and is creating less dissatisfaction from outages than did the old lamp-year contract. Under the Garner contract the city pays 10 cents per kw-hr. and turns the street lamps on and off as it sees fit. The company owns the entire equipment except the lamp bulbs. The police look after lamp renewals. The new system has stopped controversies as to lamp outages and operation on cloudy moonlight nights. Garner's population is about 1000. The cost of street-lighting energy averages about $35 per month for moonlight, midnight service.

Causes of Electrical Fires

Something may be learned, perhaps, by a perusal of typical cases mentioned in the reports of Chicago electrical inspectors for 1913 relating to electrical fires. Here are a few:

"Jan. 5, 5 p. m., one-story brick garage, 3454 Evanston Avenue. Fire caused by the breaking of a portable incandescent lamp. The lamp was unguarded and a piece of hot filament caused a gasoline explosion. Loss $4,500."

"Jan. 18, 6:47 p. m., one-story frame, Fifty-second Street and Hermitage Avenue. Fire caused by the heating of a motor main which was over-fused, setting fire to the insulation. Loss $1,500."

"Feb. 3, 11:49 p. m., eighteen-story brick, 29 East Madison Street. Fire caused by an electric sadiron left connected to a live circuit, igniting the table and woodwork. Loss $1,200."

"April 21, three-story brick, 4641-42 Michigan Avenue. Fire caused by grounded and crossed wires in service conduit near service switch located in center of basement. Loss $3,750."

"June 13, 8:35 a. m., 4621 Michigan Avenue. Water pump out of order, causing driving motor to stop. Current remained on motor, causing it to burn out. Loss $35."

"Aug. 4, 2:43 p. m., four-story and basement brick, 162 West Adams Street. A short-circuit near a gas meter burned hole in same and ignited the gas. Short-circuit was made accidentally by a meter tester while removing a jumper which was used to shunt the load around the customer's meter. Loss $25."

"Sept. 9, 10:07 a. m., 5535 Ellis Avenue. Fire caused by a short-circuit in the winding of a motor attached to a dish-washing machine. The lye in the water broke down the insulation of the winding, causing the short-circuit. Loss $10."

"Sept. 25, 5:18 p. m., 139-41 South Fifth Avenue. Fire was caused by short-circuit in drop cord. Portions of the burning cord dropped into a quantity of celluloid articles. Loss $10,000."

"Oct. 21, 10:23 a. m., 4823 Kimbark Avenue. Fire caused by a hot filament of an incandescent lamp falling on a gasoline-saturated floor, the lamp being used as a portable one in a garage. Loss $6,000."

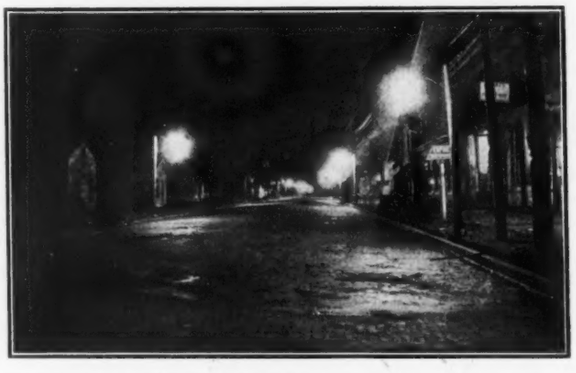
However, the total loss from electrical fires is slight, considering the loss from all fires. The accompanying table gives the causes of electrical fires in Chicago by months during 1913.

STATISTICS OF ELECTRICAL FIRES

Causes of Fire	Number	Total Loss from Each Kind of Fire
Low-tension wires grounded	1	$5
Low-tension wires short-circuited	8	287
Short-circuit in fixture outlet	1	50
Short-circuit in lamp cord	5	10,503
Short-circuit in fixture	2	2
Short-circuit in conduit	2	205
Short-circuit on gas pipe	5	105
Short-circuit in piano wiring	1	1,935
Short-circuit in broken fixture	2	302
Ground of service wires	4	4,270
Loose connections	1	200
Arc to conduit from low-tension wires	1	10
Sparks from motor	2	155
Motor armature burned out	5	1,600
Motor overheated	1	None
Defective insulation on wire	1	10
Lightning	2	40
Ignition of moving-picture film	1	100
Inflammable material about an electric lamp	2	1,147
Flatiron left in circuit	20	1,586
Heating coil becoming overheated	3	72
Sparks from switch	4	1,013
Gasoline or benzine ignited by electric sparks	6	10,805
Total	80	$34,402

High-Efficiency Lighting in Huron, Ohio

The little city of Huron, situated on the southern shore of Lake Erie, claims the distinction, through its recent installation, of being the first Ohio town to put in operation high-efficiency nitrogen-filled tungsten lamps for street lighting. The business district, shown in the accompanying illustration, is lighted by thirty-six 250-cp units placed 100 ft. apart, while in the residential section 132 100-cp lamps placed about 200 ft. apart are



NITROGEN-FILLED TUNGSTEN LAMPS ON HURON STRRET

used, being installed on but one side of the street. Each lamp is mounted on a 4-ft. wrought-iron bracket, the large lamps being 14 ft. above the street and the smaller ones 1 ft. lower. Wheeler reflectors of the 18-in. radial-wave type are employed throughout the entire system. The energy for operating the lamps is derived from the municipal electric-light plant. The lamps are all connected on a single series circuit in which the current is maintained constant at 6.6 amp by means of a Packard regulator. According to Mr. John C. Britton, superintendent of the municipal station, the new lamps have been giving satisfactory service, and local residents declare the illumination to be a decided improvement over the former system.

Lighting a Club-House Entrance

The entrance lighting of the Hunnewell Club, of Newton, Mass., has recently been greatly improved by the installation of a 150-watt tungsten lamp in an alabaster-type fixture in each of the two main porches

ENTRANCE LIGHTING OF CLUB HOUSE

of the building. The lighting plan typifies hospitality to the visitor, the spacious porch being particularly well illuminated. The fixture is hung about 9 ft. above the floor of the piazza, and the porch in front of the door is about 10 ft. square. The cream-colored, Colonial entrance is well brought out by the lamp selected. Service is furnished by the Boston Edison Company.

Letters to the Editors

Absorption of Electromagnetic Waves

To the Editors of the Electrical World:

SIRS:—Prof. A. H. Taylor's article on "Wireless and Weather," which appeared in the *Electrical World* of Aug. 30, 1913, might lead one to expect to find some relation between audibility of received signals and cloudiness of the country intervening between such places as Arlington, San Francisco and Key West. Last year the University of California, on the Bay of San Francisco, carried on a series of observations of Arlington time signals every night for over a month. The signals were observed for the astronomy department to get the longitude from Washington, D. C., by wireless. We have on file the records of approximate intensities and weather maps for the period of time covered.

The writer had great expectations of being able to tell what weather would aid and what would hinder observations on the time signals from Arlington. The daily weather maps were inspected carefully to find some relation between "Wireless and Weather." The results were all negative.

Perhaps the coincidences which Professor Taylor observed between cloudiness and good signals were accidental, mostly due to other causes.

The university stations are both equipped with first-class audion detectors and amplifiers and are able to receive readable signals from the Atlantic Coast stations any night of the year. We are situated uniquely for observing changes in the intensity of received signals over either land or water.

The data we have on file are very interesting to study, but seem to be more of a Chinese puzzle than anything else. So far we have been unable to ascribe any change in the audibility of signals to any special kind of weather.

The Weather Bureau's reports would help more in this respect if it could obtain information in regard to the ionization of the atmosphere as well as the regular weather data.

Berkeley, Cal. RAYMOND B. ABBOTT.

Payment and Responsibility of Directors

To the Editors of the Electrical World:

SIRS:—I was much interested in an editorial appearing in a recent issue of the *Electrical World* as to the responsibility of directors of public service corporations. In that editorial you stated: "It is idle to say that directors cannot do more in the future to safeguard properties, . . . but they will have to give time and thought far beyond their past ideas."

In this connection it may be of interest to note the annual compensation of directors of certain public lighting companies of Massachusetts. The Edison Electric Illuminating Company of Boston has a gross income of about $6,500,000 a year and serves a population of 1,000,000 people living in thirty-nine cities and towns, yet a director of this corporation receives as compensation for his services only $74.17 a year.

An inspection of the following table suggests the thought that neither the stockholders nor the public can expect to have their interests properly looked after by directors who are paid for "time and thought" the very modest compensation indicated:

Headquarters of Company	Annual Pay of a Director	
	Amount	Cents, for Each Dollar of Gross Income
Boston	$74.17	0.0012
Brockton	12.00	0.0028
Lowell	22.14	0.0051
New Bedford	58.85	0.0080
Lawrence	65.71	0.0081
Charlestown	45.71	0.0114
Worcester	100.00	0.0150
North Adams	62.00	0.0264
Cambridge	443.33	0.0988

Directors of public service corporations are trustees of the money of the investors and of the interests of the public. Their duties as trustees are of a peculiarly responsible and complicated nature and their compensation should certainly be much more than 12 cents for each $10,000 of income before they can reasonably be expected to give more "time and thought."

Lynn, Mass. EDWIN F. DWELLEY.

Field of the Operating Engineer

A Record of Practice, Experience, New Ideas and Interesting Problems—Notes on Practical Subjects—Questions and Answers

Different Transformer Types Gave Reversed Polarity

When the Fort Wayne & Northern Indiana Traction Company recently changed its lighting distribution system in the city of Fort Wayne, Ind., from a two-phase, four-wire system to a three-phase, four-wire system, the transfer crew met with one unforeseen difficulty. Practically all the transformers on large motor-service installations were changed early one Sunday morning, the fourth wire, which was to have been used as the neutral, having been previously traced out and "spotted" with brass tags at all necessary points. On the third large set of transformers a unit of the old type and one of more modern manufacture were operating in the same bank. These units when reconnected immediately gave evidence of the fact that they were operating under excess voltage. Investigation showed that the pressure on one phase ranged from 345 volts to 360 volts, while between another pair of wires there existed a potential difference of only 115 volts. Investigation also showed that the taps on the older type transformers were brought out of the case in reversed arrangement with respect to the newer type transformer, although the transformers were all of the same manufacture. Reversing the connections relieved the abnormal voltage strain and at once corrected the difficulty.

All transformer installations changed from that time on were first fused with a fuse wire large enough to carry only the exciting current of the transformers until a voltage test could be obtained. As soon as the polarities were found correct the bank of transformers was fused to its full rating. Later it was learned that the numbers borne by the transformer units would have informed the workmen which way the leads were brought out had application been made to the manufacturing company for this information.

In changing over the system from two-phase to three-phase approximately 425 motors were rewound, the expense of these changes being borne by the Fort Wayne & Northern Indiana Traction Company. In addition to the expense involved for the company by the change-over, great difficulty was experienced by Mr. E. S. Myers, chief engineer, and Mr. Stagg, of the contract department, in convincing customers that any other troubles they might happen to have were not due to changes in the motors. However, with the change completed it is expected that operation will become much more economical.

Coal Waste in Center-Dump Cars

Greater plant economy—that goal toward which every engineer is striving—was the subject discussed by Mr. F. M. Wilkes, Poplar Bluff, Mo., in a paper read before the Missouri Public Utilities Association. Describing a trip through his generating station accompanied by the president of the organization, the speaker said: "As luck would have it, just as we started to the plant two 'hoboes' whom I had employed to unload coal came into the office with a slip from the plant engineer stating that they had finished unloading their car of coal and desired their money. I paid them and we proceeded to the plant.

"The car which they had just been unloading, supposedly empty, was standing on the side track next to the coal bin. It was a center-dump car with pockets in the bottom, and the sight of these must have suggested something to my companion. He proposed that we go over and look at the car and see if it was thoroughly cleaned out. We found that the 'hoboes' had done a fairly good job of emptying the car, but each of the pockets still contained about one-quarter of a ton of coal which had not been removed because it was too difficult to shovel out. This coal had probably been in the car ever since it hauled its first load and I have no doubt that our company had already paid for that same coal more than twice. And not only had we paid for the coal, but also the freight on it and the 'hoboes' to unload it—which they failed to do. Since then I have had every lump removed from the bottom of each car, for I did not relish the idea of sending about a ton of coal back to the mines for reshipment to me and perhaps to be again returned to them, and so on—until the car and the coal got worn out and the railroad had to get a new car and new coal and start all over again!"

Water-Cooled Rheostat for 7500 Kw at 6600 Volts

By C. Edward Magnusson

When arranging for a test on a 5000-kw, 6600-volt, three-phase generator in a hydroelectric plant it developed, first, that no commercial load was available for testing purposes, and, second, that no permanent load rheostat would be required as the generators were designed for runaway speed. It therefore became necessary to provide a temporary load satisfying the following requirements: (a) Terminal emf on load, 6600

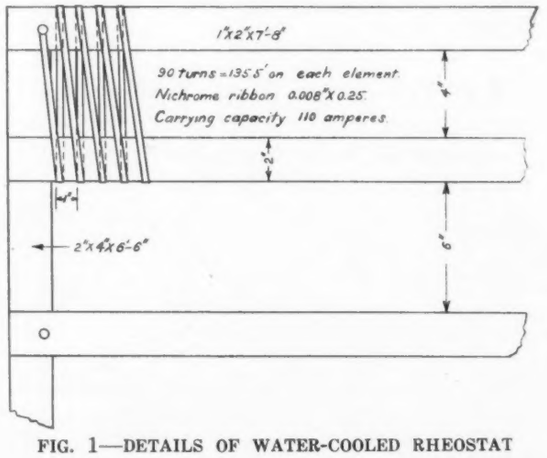


FIG. 1—DETAILS OF WATER-COOLED RHEOSTAT

volts; (b) maximum load, 7500 kw; (c) subdivisions for taking suitable points on the load-efficiency curve; (d) unity power-factor and steady load at all points, and (e) minimum cost.

All the conditions were complied with in a satisfactory manner by a water-cooled, nichrome-ribbon rheostat. A series of tests had been made by Messrs. Mul-

len and Fukagava in the laboratory of the University of Washington on the carrying capacity of nichrome ribbon. These tests were made at low voltages.

Since the water must provide the insulation between the several strands of the rheostat, a sample of the water was tested for its specific resistance. This was found to be 8200 ohms per cu. cm at 20 deg. C.

The test was made in February, and while the water is of glacial origin, the abundant rains in the winter swelled the river and thus reduced the percentage of fine silt held in suspension. The only available place for submerging the rheostat, without building special tanks, was in the tailrace. This provided excellent circulation, but trouble was experienced in anchoring so as to keep all parts under water at all loads.

The rheostat was made from nichrome ribbon 0.25 in. by 0.008 in., having a resistance of 0.26 ohm per foot. In the description of the rheostat the dimensions differ slightly from those used on the test so as to give one-fourth load per element, the points required on the load-efficiency curve. Moreover, the spacing between the elements has been increased to provide a larger factor of safety.

In Fig. 1 are shown the dimensions of an element of the rheostat. The ribbon was wound spirally on two strips of fir wood and kept in position by means of double-pointed tacks. Six elements were placed in parallel with a 6-in. spacing, making a unit for one phase. The three units were star-connected, thus giving a maximum of 3800 volts to produce leakage between the closed and open elements of each unit, and

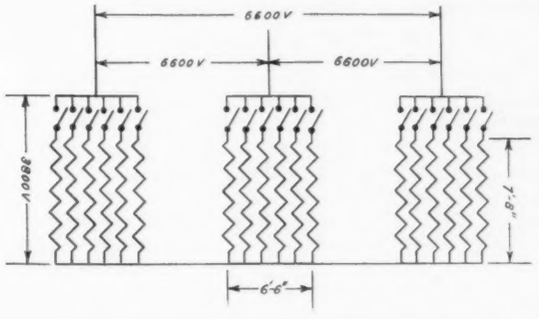


FIG. 2—CONNECTIONS TO RHEOSTAT

a total of 6600 volts between the terminals of the three phases.

In the test the units for the three phases were arranged as shown in Fig. 2, as this made a simple float which could be handled to best advantage in the swift current of the tailrace.

Some difficulty was experienced in providing a satisfactory contact between the end of the nichrome ribbon and the copper leads. With care, double brass washers will serve the purpose, but a solder, suitable for both nichrome and copper, would be preferable.

Necessarily a rheostat of this type will give unity power-factor and also the much desired steady load at all points. Whether the last, but not least, factor—that is, minimum cost—was met may be a question of opinion, the cost data being as follows:

16.5 lb. nichrome ribbon, at $4	$66.00
Lumber, etc.	4.00
Labor	10.00
Total	$80.00

The nichrome ribbon was not damaged. As the elements are light, this type of rheostat can readily be crated and shipped and hence used on several tests, or the ribbon may be removed and used for other purposes.

How to Prevent Accidents Shown by Means of Pictures

The Rochester (N. Y.) Railway & Light Company, which was among the first central-station organizations to adopt systematic methods for preventing accidents, makes a practice of displaying pictures showing its employees "the right and the wrong way" when working about electrical apparatus. The accompany-

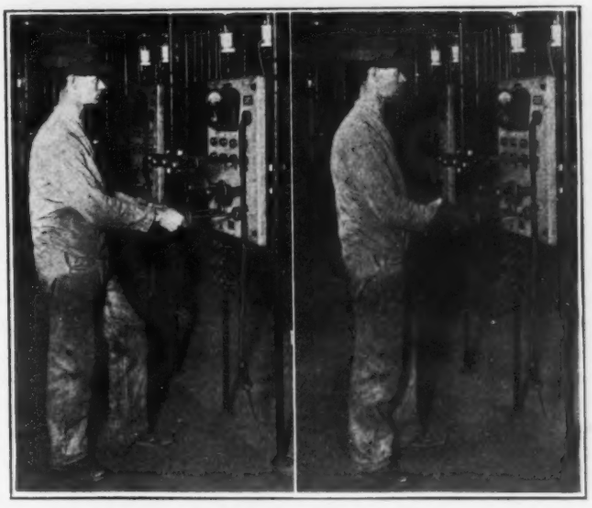


FIG. 1 — THE CARELESS WAY—HANDS UNPROTECTED

FIG. 2—THE SAFE WAY —HANDS PROTECTED BY GLOVES

ing illustrations depict a switchboard attendant inserting arc-lamp-circuit plugs. Fig. 1 represents the wrong way (hands bare) of performing this operation, while Fig. 2 shows the right way, that is, with the hands protected by rubber gloves. The necessity of wearing rubber gloves on such occasions should be apparent to anyone who has stopped to consider that the insulated handles of arc-circuit plugs may contain minute cracks and that the potential between the positive and negative plugs is several thousands of volts. Photographs such as these are effective in educating electrical workmen to safety-first principles, especially if their attention is attracted thereto by their personal interest in the individual workman who has posed as both the careful and the careless operative in the particular pictures under notice.

Effect of Altitude on Operating Temperature

Please state the effect of high altitude on the operating temperature of electrical machinery. H. L. N.

With increased altitude a higher temperature rise is noted in some classes of electrical apparatus, due doubtless to the attenuation of the air at high levels. High altitudes, however, are usually also accompanied by low humidities, and this absence of water vapor doubtless contributes to reducing the heat convection away from the radiating surfaces of the machine, thus making its temperature rise more rapidly. Most electrical apparatus is manufactured and tested within a few hundred feet of sea level, and it is commonly assumed that no machinery will ordinarily be called upon to operate at altitudes much exceeding 3000 ft., although there are a number of plants in the West more than a mile high. Probably the highest commercial stations are those supplying energy to the cities of Leadville and Cripple Creek, Col., each at an elevation of about 11,000 ft.

Digest of Current Electrical Literature

Abstracts of Important Original Articles Appearing in the Periodical Electrical Press of the World

Generators, Motors and Transformers

Determination of Polarity.—E. Rosenberg.—In order to determine whether the successive poles in a multipolar magnet system are correctly connected, a magnet needle is often used, but its use is uncertain. If it is used near the armature, the magnetic field is so strong that the polarity of the needle may be easily reversed. If it is used on the outside of the yoke, it fails at places where there are attachments, for instance at the feet. Exact results may be obtained with the following method which can also be applied on machines in operation: The author uses a coil attached to a handle and connected in series with a millivoltmeter. The coil has a light iron core, but is completely insulated on the outside so that nowhere is there danger of metallic contact. The coil is brought near the magnet pole to be tested until it makes contact with the magnet coil and is then drawn away quickly. According to the polarity of the magnet pole the needle of the millivoltmeter is deflected in one or the other direction. The apparatus is so sensitive that the remanent magnetism of the machine at rest can be investigated by this method. Quite interesting results are occasionally obtained with machines with interpoles. With a loaded six-pole motor each interpole showed correctly the polarity of the preceding main pole (preceding in the sense of direction of rotation), but when the motor was running unloaded one interpole showed reversed polarity. This indicates a lack of accuracy in the mechanical construction of the machine. By investigating the remanent magnetism by means of such testing coils it is possible to determine with interpole machines whether the machine has been operating as a motor or generator, if its last direction of rotation is known. This may be of importance, for instance in case of a tramway accident, if the motorman makes a statement that he tried to brake dynamically but did not succeed. For in such a case, the last direction of rotation of the machine being known, the magnetic test will indicate whether the machine has finally been excited as a generator or not. The author uses a coil of the following dimensions: Outside diameter, 44 mm (1¾ in.); inside diameter, 19 mm (¾ in.); length of winding, 50 mm (2 in.); iron core diameter, 10 mm (25/64 in.); length, 63 mm (2½ in.). The coil has 580 turns of copper wire of 0.8-mm (1/32-in.) diameter. The total resistance is about 1.5 ohms; that is, it is approximately equal to that of the millivoltmeter. —*Elek. Zeit.*, July 23, 1914.

Lamps and Lighting

Instantaneous Values of Illumination.—Johann Sahulka.—An illustrated English translation in abstract of his German article on instantaneous values of the illumination from alternating-current arcs which has already been noticed in the Digest.—London *Electrician*, July 31, 1914.

"Cathode-Type" Incandescent Lamp.—H. Greinacher.—An illustrated English translation in abstract of his recent German article which has already been abstracted in the Digest.—London *Electrician*, Aug. 7, 1914.

Generation, Transmission and Distribution

High-Tension Engineering at the Swiss Exhibition in Berne.—Karl Kuhlmann.—The recently opened Swiss exhibition in Berne has a large electrical department in which high-tension apparatus is particularly well represented. Brown, Boveri & Company exhibit a high-tension transformer for 500,000 volts, 200 kva and 100 cycles, also measuring transformers for voltages from 3000 to 35,000. They are all designed according to the standardization rules of the German Association of Electrical Engineers. The same is true for oil switches, which are now being made in standard types for 3000, 6000, 12,000, 24,000 and 35,000 volts respectively. In a special design of a three-pole oil switch for 1500 volts and 6 amp the main contacts are in air while the final contacts are in oil. The Oerlikon Company also exhibits various special designs, among them a 500,000-volt, 500-kva, fifty-cycle transformer. It has a round oil receptacle with a content of 16,000 kg of oil, pertinax being used for insulation. The same company exhibits high-tension switchboards and oil switches.—*Elek. Zeit.*, July 23, 1914.

Traction

Electrification of Indian Railways.—Merz and McLellan.—An abstract of a long report to the railway department of the government of India on the possibilities of employing electric traction on certain sections of the Eastern Bengal State Railway in the neighborhood of Calcutta. The report is divided into four parts, in the first of which the general question of electric traction is dealt with at some length, suburban, terminal, heavy gradient and main-line electrification being all considered. As a result the conclusion is reached that both in capacity and efficiency the electric is superior to the steam locomotive. Part II deals with the suburban system of the Eastern Bengal Railway in detail. Part III deals with the possible policy of the neighboring railway bodies with regard to electrification, and Part IV deals with the relative cost of different systems of electric traction. It is possible that the electrification may be carried to a distance of 150 miles from Calcutta. As might be expected, the choice of system resolves itself into a choice between single-phase and high-tension continuous current, and Merz and McLellan have decided in favor of the latter. The pressure of the line has been provisionally fixed at 1500 volts, though it is possible that 3000 volts may ultimately be decided upon. The advantage in favor of continuous current is shown to be over $4,000,000 in capital cost on a scheme costing about $20,000,000, and the annual costs are shown to be about $150,000 less than with single-phase.—London *Electrician*, July 31, and Aug. 7, 1914.

Installations, Systems and Appliances

Newport Station.—An illustrated article on recent developments in connection with the Newport (Monmouthshire, England) generating station, comprising an addition to the generating plant at the East power station and an addition to the converting plant at the Llanarth Street station. The lowering of the frequency of the single-phase supply is also planned. At

the present time there is a single-phase supply at 2000 volts and a frequency of 87.5, while the three-phase supply is at 6000 volts and a frequency of 50. The extension comprises essentially a 3000-kw turbo-alternator running at 3000 r.p.m. and generating three-phase currents at 6000 volts and a frequency of 50.—London *Electrician*, July 31, 1914.

St. Ouen Plant, Paris.—T. PAUSERT.—An illustrated article giving some details of the equipment of the new Saint-Ouen generating station in Paris.—*La Revue Elec.*, June 5, 1914.

Moravia.—KARL SUWALD.—At the close of 1913 there were in Moravia eighty-nine electric stations, with an aggregate rating of 50,000 kw. The two largest plants are those of the Northern Railroad at Hruschan with 17,000 kw and the Rossitz central station in Oslawan with 11,500 kw. The latter supplies electricity to an industrial district and to the city of Brünn. At present districts with about 1,000,000 inhabitants are reached, while other regions with 1,620,000 inhabitants are still to be developed for service. The author discusses this possibility with special reference to the coal deposits and water-powers available in Moravia.—*Elek. u. Masch.* (Vienna), July 5, 1914.

Wires, Wiring and Conduits

Rating of Switch-Gear Conductors.—B. E. G. MITTELL.—The author enumerates a number of disadvantages of including in specifications clauses relating to current density in the connections. It is urged that this is unscientific, and that instead makers should be required to guarantee maximum and average values of temperature rise. The temperature rise of connections depends not only on the heat generated in them but equally on the area of surface available for dissipating this heat. Hence to specify one only is, at the very best, a rough method. The shape of the section is more important in the case of alternating current owing to skin effect. Heavy busbars, consisting of a number

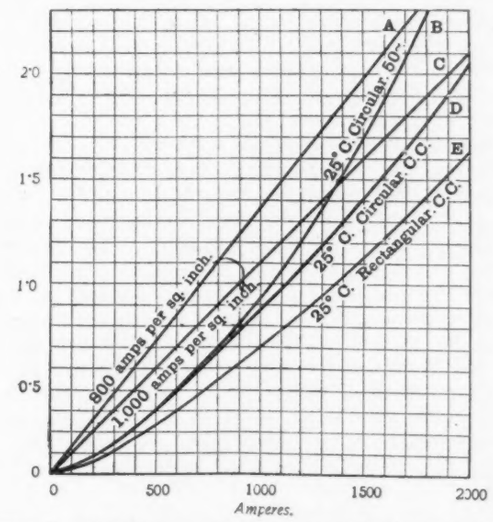


FIG. 1—VARIOUS RATINGS OF CONDUCTORS IN AIR

of strips in parallel mounted on edge, are more efficient than heavier bars having less surface. In the case of aluminum the larger surface allows a considerably higher density to be used than is given by a comparison of specific resistance with copper. Fig. 1 shows area of conductor plotted against current, the values being approximate and for continuous current. Curve *D*—for circular conductors—is seen to approach the 1000-amp-per-sq.-in. rating as the size is increased. For smaller currents a considerably higher rating can be used. The temperature rise taken—25 deg. C.—is very moderate and can safely be exceeded where there is normal circulation of air. The influence of the area for radiation is clearly shown by the difference between curves *D* and *E*. Curve *E* is plotted as an average between the points obtained in practice. It is very undesirable to stock a large number of different sizes of copper, and hence a curve plotted accurately would show a number of peaks. The significance of this lies in the obvious difficulty of keeping every part of the connections below the rated density or temperature rise without unnecessary waste, and in the desirability of permitting a reasonable amount of variation. Curve *B* shows the increased area required for fifty-cycle alternating current where plain solid circular copper conductors are used. In practice methods are adopted for straightening out this curve. For twenty-five cycles the curve is of similar shape, but rises more slowly. For average rectangular conductors the curve lies only very slightly above that for continuous current for the range of current values given.—London *Electrician*, Aug. 7, 1914.

Overload Time Relays.—P. BENDMANN.—The author discusses the use of adjustable overload time relays for the regulation of a supply network and shows how to determine the proper adjustment.—*Elek. Zeit.*, July 23, 1914.

Electrophysics and Magnetism

Emission of Electricity from Substances at High Temperatures.—A brief note on a paper presented by G. W. C. Kaye and W. F. Higgins at a recent meeting of the (British) Royal Society in which they described experiments conducted at temperatures from 2000 deg. C. to 2500 deg. C. within a carbon-tube furnace at atmospheric pressure. Under these conditions the electrical emissions, in the absence of any applied potential, were measured for a number of substances (including the alkaline earths and the metals, tin, aluminum, iron and copper) on their introduction into the furnace. During their rapid volatilization the substances gave out large amounts of electricity which, with one exception, were negative in sign. For example, barium oxide and alumina generated negative currents of the order of 4 amp per sq. cm, boiling tin about 2 amp per sq. cm, and boiling iron about 1 amp per sq. cm. Boiling brass, on the contrary, produced a positive current of about 0.5 amp per sq. cm. The results have interest in connection with the problems of solar magnetism.—London *Electrician*, July 3, 1914.

Passage of Cathode Particles Through Gases.—L. W. MCKEEHAN.—An account of an investigation the object of which was to determine whether a very narrow pencil of cathode rays is scattered by traversing a high vacuum. There was no scattering in the high vacuum, but on raising the pressure in the test chamber the scattering became apparent.—*Phys. Rev.*, August, 1914.

Electrochemistry and Batteries

Silver and Iodine Voltameter.—G. W. VINAL AND S. J. BATES.—A paper giving the results of a comparison of the silver and iodine voltameters and a determination of the value of the faraday. The authors made a careful comparison of the silver and iodine voltameters, using them in series so that the deposits of silver and iodine should be strictly comparable. The chief results are as follows: Ratio of silver to iodine, 0.85017; electrochemical equivalent of iodine, 1.31502; value of the faraday, 96,515 (I = 126.92); value of the faraday, 96,494 (Ag = 107.88); value recommended for general use, 96,500. The second, third and fourth of these values were calculated on the basis of the international ampere, using 1.11800 mg per coulomb as the electrochemical equivalent of silver.—*Bulletin*, Bureau of Standards, Vol. 10, No. 3, 1914.

Units, Measurements and Instruments

Measuring of High-Frequency Alternating Currents.—A note on a paper read by A. Campbell and D. W. Dye before the Royal Society in London on some investigations carried out at the National Physical Laboratory. As the accurate measurement of currents larger than 1 amp at high frequencies has presented considerable difficulty, the authors investigated the accuracy obtainable in the use of air-core current transformers (suggested by T. L. Eckersley). It was found that, with proper design, such transformers allowed of the measurement of currents up to 50 amp or higher, at frequencies from 50,000 up to 2,000,000 per second, with an accuracy of one or two parts in 1000. Over the same range of frequency it was also found that iron-cored transformers could easily be designed so as to give very accurate results. As an auxiliary standard for measuring high-frequency currents of about 1 amp to 5 amp a thermal ammeter was used, consisting of a heated wire and thermopile both immersed in oil, the pile being connected to a low-resistance galvanometer. With this instrument a scale almost exactly proportional to the current (and not to its square as might be expected) could be obtained.—London *Electrician*, Aug. 7, 1914.

Electrometer.—B. SZILARD.—An illustrated description of a direct-reading electrometer for the measuring of very small currents. This has already been described in the Digest.—*Journal de Physique*, March 10, 1914. An English translation in abstract in London *Electrician*, July 31, 1914.

Telegraphy, Telephony and Signals

Simplification of Telephone Theory.—J. A. FLEMING.—The author describes methods for the easy determination of the current and voltage at the receiving end of a telephone line. These methods are partly graphical and partly mechanical in their nature and are intended for practical use.—London *Electrician*, July 31, 1914.

Wireless Telephony.—An illustrated article on the Colin-Jeance system of radiotelephony. The continuous waves employed in this system are produced by three arcs connected in series, each arc having a carbon and

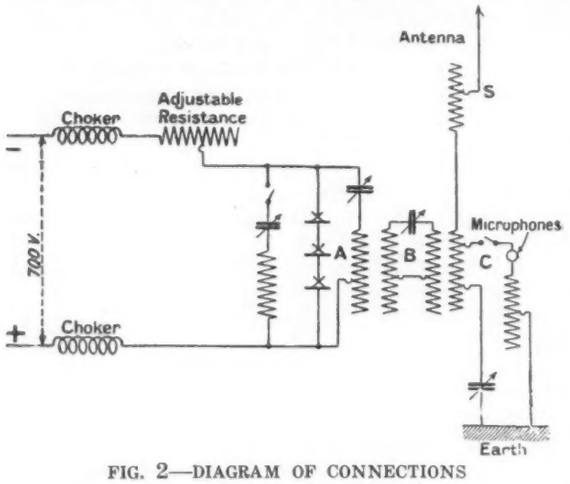


FIG. 2—DIAGRAM OF CONNECTIONS

copper electrode. The carbon electrode is of about 1.5 mm in diameter and is attached to the negative pole. The copper positive electrode is in the form of a disk. This disk is very easily replaced and forms part of the base of a cylinder filled with paraffin and cooled by water circulation. The arcs are "struck" in an atmosphere of carbureted hydrogen gas, which may, for example, be produced by mixing in correct proportions acetylene gas generated from calcium carbide and hydrogen generated from calcium hydride. The principal oscillatory circuit consists of an inductance and variable condenser *A* connected in parallel with the arcs. (Fig. 2). An intermediate oscillatory circuit *B*, consisting of an inductance and variable condenser, is utilized to couple the principal circuit with the antenna and insures that multiple waves generated in the main circuit are not transmitted to the antenna, the result being that only a single wave is emitted. The antenna circuit consists of an inductance coupled with the circuit *B* and a variable condenser. A variable self-induction is also used in the aerial. The microphone circuit consists of nine carbon microphones connected in series and so arranged that they are all acted upon by the voice simultaneously by means of a megaphone. The microphones are connected between the variable inductance of the oscillation transformer and the earth as shown at *C*. With this system conversations have been carried on between Paris and Mettroy, a distance of 200 km (120 miles).—London *Electrician*, July 24, 1914.

Wireless Telegraphy and Aeronautics.—H. THURN.—An illustrated article on the relations between wireless telegraphy and aeronautics with special reference to the Telefunken system and the systems of Huth and Lorenz. The author discusses typical equipments for wireless stations on balloons and arrangements of the antenna and finally discusses the use of wireless telegraphy for determination of the position of an airship.—*Elek. Zeit.*, July 9, 16 and 23, 1914.

Book Review

THE MECHANICAL DESIGN AND CONSTRUCTION OF GENERATORS. By R. Livingstone. London: The Electrician Printing & Publishing Company. 222 pages, 123 illus. Price, 9 shillings.

Many good books on the design of electric generators and motors are now available, and some of these devote a chapter or two to the discussion and calculation of mechanical features such as stiffness of shafts, centrifugal forces in high-speed machines, and similar subjects of great importance to the man who has to design modern electrical machinery in all its details. Mr. Livingstone has given us a book from which the purely electrical problems are excluded; the point of view is that of the mechanical engineer, and the strength, stiffness and durability of the various parts of rotating electrical machinery are clearly presented and adequately discussed. The opening chapters deal with such matters as pulleys, belt and rope drive, toothed gearing as applied to motors, shafts and bearings for low-speed machines, couplings and rotor hubs. Methods of keeping armature stampings in position are explained and the author's method of calculating the stresses in the end plates or clamping rings is thoroughly discussed. A careful study of his methods may lead to a saving of material, as the admitted difficulty of calculating the stresses in these clamping plates sometimes results in too great a factor of safety being used. Other chapters discuss the stresses in the stator frame resulting from unbalanced magnetic pull and the effects of high velocities on the rotor. The mechanical design of high-speed steam-turbine-driven machines is especially well treated; there are drawings showing different types of rotors, and rules for proportioning the shafts and bearings of these high-speed machines. The book is not highly mathematical and it is written with the practical end in view. In the opinion of the reviewer, this is the best book dealing with the mechanical design of electrical machinery that he has seen.

New Apparatus and Appliances

An Illustrated Descriptive Record of Recently Developed Manufactured Products of Interest to Electrical Readers

Direct-Current Portable Meter

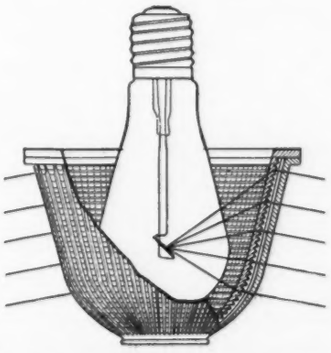
The portable meter shown herewith is of the dead-beat, moving-coil type, with a permanent magnet and movement designed to secure compactness and light weight. The scale measures 4.5 in. long and has 100,

PORTABLE METER

125 or 150 divisions according to the range. The instrument is equipped with a zero adjuster and a mirror to avoid parallax errors. The accuracy of these instruments, the manufacturer claims, is 0.05 per cent for the voltmeters and 1 per cent for the ammeters. Ammeters with ratings up to 62.5 amp are self-contained. The instrument is inclosed in a dull-finished black-walnut case with a leather handle. The dimensions are 6 in. by 5.25 in. by 3.125 in., and the weight is less than 3 lb. This meter is being placed on the market by Mr. Louis M. Pignolet, 78 Cortlandt Street, New York.

Refractor for Street Lighting

Double-bowl refractors which distribute light from concentrated-filament lamps in a manner especially desirable for street illumination are being manufactured by the Holophane Works of the General Electric Com-



CROSS-SECTION OF REFRACTOR, SHOWING ACTION OF HORIZONTAL PRISMS

pany, Newark, Ohio. These refractors provide uniform horizontal distribution with the principal flux at 80 deg. from the vertical. The construction of one of these refractors is shown by the accompanying cross-sectional view. It consists of a bowl within a bowl, the surface where the two join being air-tight and dust-proof. The inner and outer surfaces of the assembled refractor are smooth so that they may be easily cleaned. Refraction takes place at the two adjacent surfaces which contain prismatic grooves. The grooves extend horizontally around the outer surface of the inner bowl, concentrating the light flux at 80 deg. from the vertical axis.

Self-Starting Single-Phase Induction Motor

Self-starting single-phase induction motors which will operate in either an upright or an inverted position are being manufactured by the Bodine Electric Company, 564 West Randolph Street, Chicago, Ill., in sizes from 0.125 hp to 0.25 hp. The rotor and stator

SINGLE-PHASE INDUCTION MOTOR

laminations of these motors are made of annealed electric steel, both surfaces of which are treated with varnish to reduce eddy currents. The laminations in the stator are held together by four bars riveted on the ends, while the rotor laminations are clamped between copper end-disks held together by the copper rotor bars, which are riveted and soldered. Fastening the rotor core to the shaft is a spider, one end of which is shaped like a blower fan to force air through the machine when it is operating. The stator winding is of the split-phase type wound on forms which can be removed from the slots. Insulating varnish is used to impregnate the coils when they are in place.

The motor shaft, which is removable from the rotor spider, is supported on long bronze bearings. These are lubricated by wick oilers which can be reversed in position when it is desirable to operate the motor in an inverted position. Mounted on the shaft is a centrifugal switch which disconnects the starting winding when the rotor has attained full-load speed. The motors are self-starting even under full load.

Separable Attachment Plug of Molded Insulation

Separable attachment plugs of molded insulation are being manufactured by the Metropolitan Electrical Supply Company, 17 Park Place, New York City. The cap and screw plug are both very compact, the former

SEPARABLE ATTACHMENT PLUG MADE OF MOLDED INSULATION

projecting only a short distance beyond the receptacle when the plug is screwed therein. The molded insulation, which is made to resemble black rubber, is extremely tough and will withstand hard usage. These plugs are particularly useful with portable appliances as they will pull out if the apparatus is dropped or the cord is jerked, thus preventing the breakage of cords and plug connectors.

Electric Dental Sterilizer

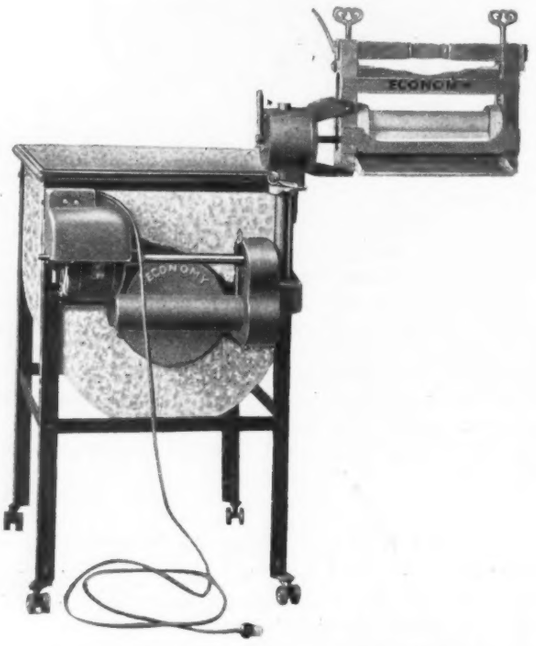
The electric device for sterilizing dental instruments shown in the accompanying illustration consists of a glass water receptacle in the bottom of which is a disk-shaped heater supplied with energy through an insulated tube extending up one side of the jar. Resting on the heating element is a metal basket having a perforated bottom for holding the instruments in a vertical position while they are being sterilized. As the receptacle holds only one pint of fluid, it requires but a short time to bring water placed therein to a boiling temperature. Moreover, the entire heater is immersed as long as there is any water in the jar, so there is little chance of the temper being drawn out of the steel instruments placed therein and the glass is not likely to be cracked. The cover, base, tray, and even the heating element, are

RECEPTACLE FOR STERILIZING DENTAL INSTRUMENTS

made of solid aluminum which will not rust or corrode, therefore the outfit is perfectly sanitary. Each sterilizer is provided with 6 ft. of green-silk-insulated conducting cord and a separable plug. By having one of these devices near the operating chair the dentist is saved considerable time in sterilizing his instruments, and the evidence of cleanliness and care invariably pleases the patient. The manufacturer is the Quick Electric Heater Company, Cincinnati, Ohio.

Washing Machine with Reversible Wringer

An electric washing and wringing machine consisting of an all-metal tub, inclosed operating mechanism and reversible, swinging wringer is being manufactured by the Pittsburgh Gage & Supply Company, Pittsburgh, Pa. The tub, which is made of copper or galvanized iron, as desired, is supported on a frame constructed entirely of angle irons and provided with universal double-wheeled casters. Attached to one side of the frame are the motor, the cylinder-reversing mechanism and the transmission to the wringer, all of which are inclosed to prevent injury and to protect the apparatus from water. Just above the motor is a two-button switch for starting and stopping the machine. A lever for disengaging the washer cylinder when only



ALL-METAL WASHER AND WRINGER

the wringer is to be operated is attached to the cylinder-reversing-mechanism case.

The wringer is supported on a bracket pivoted to swing about the vertical wringer-transmission shaft as an axis. The casing shown at the top of the vertical shaft contains the reversing mechanism for the wringer. A safety release is also provided for separating the wringer rolls in an emergency. By arranging the rinsing tubs in the proper relation around the washer it is possible to use the swinging wringer between each pair of tubs without the inconvenience usually attending the operation of changing ordinary wringers from tub to tub. When the machine is not in use the wringer and reversing mechanism can be lifted off the vertical shaft, leaving a plain-topped stand which may be covered and used for a table.

An ordinary-sized family washing can be completed in about two hours with this machine, at a cost of from 1.5 cents to 2 cents for energy, depending on the rate charged for electric service. This apparatus is made in two sizes, capable of washing eight and fourteen sheets respectively.

Series Incandescent-Lamp Street Fixtures

Street fixtures with porcelain receptacle heads designated as 1914 models are being made by the Wheeler Reflector Company, Boston, Mass. These units are interchangeable and are made up in hooded, unhooded,

FIG. 1 — FIXTURE WITH HOODED REFLECTOR

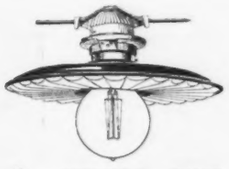


FIG. 2 — FIXTURE WITH CENTER-SPAN SUSPENSION AND 23-IN. HOODED REFLECTOR

suspension and bracket types. The porcelain receptacle head, the manufacturers declare, is of high-grade porcelain, and the spring-clip series receptacle is molded in one piece with it. A cast crown supporting the head is threaded for brackets of 0.75-in. or 1.25-in. pipe, or

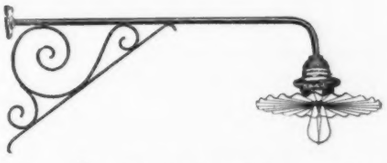


FIG. 3 — FIXTURE WITH ORNAMENTAL BRACKET AND FLAT-FLUTED UNHOODED REFLECTOR

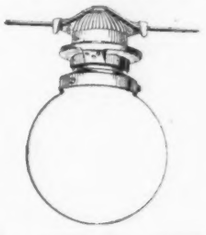


FIG. 4 — FIXTURE WITH CENTER-SPAN SUSPENSION AND LARGE GLOBE

may be equipped with lugs cast integral with it for center-span suspension. A cast skirt bolted to the head is provided with screws to support the different types of reflectors and globes.

Combined Flush Switches and Receptacles

Flush push-button switches equipped to receive plug connectors are being manufactured by the Metropolitan Electric Manufacturing Company, Long Island

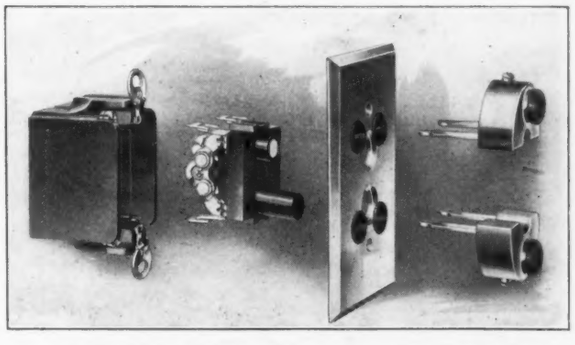


FIG. 1—FLUSH SWITCH WITH PLUG RECEPTACLES

City, N. Y. The internal construction of the combined switch receptacles is similar to that of the standard flush switch which this company is producing except that brass clips for receiving the plug tangs are attached to the mechanism support as shown in Fig. 1. In some of the switches one pair of clips is connected to the supply terminals and the other to the controlled circuit. When connected in this manner the first plug circuit is energized at all times while the other is controlled by the switch. In other switches both pairs of clips are connected to either the controlled or supply circuits. When only one plug attachment is desired

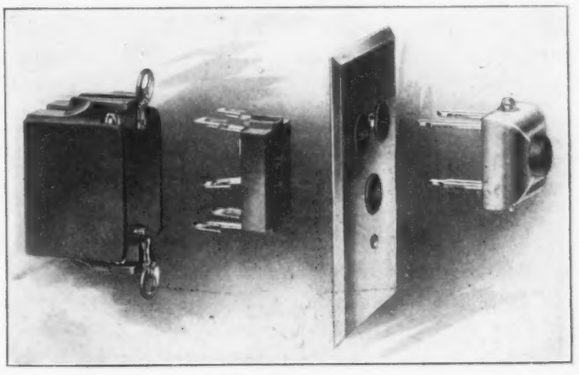


FIG. 2—THREE-CIRCUIT PLUG RECEPTACLES

the face plate is furnished with one set of receptacles. By changing the face plate both pairs of clips may be utilized.

This company is also manufacturing flush receptacles without the switch mechanism. These are made for two sets of two-wire plugs or one three-circuit plug. A receptacle designed for the latter is illustrated in Fig. 2. Three-wire receptacles may be employed where it is desirable to supply energy to pedestal or table fixtures having two circuits which must be controlled separately.

Ventilator for Telephone Booths

Motor-driven multi-blade blowers for ventilating telephone booths are being placed on the market by the Western Electric Company, 463 West Street, New York City. The sound-proof quality of a booth equipped therewith is not destroyed nor is conversation interfered with, as the blower operates practically without noise. By connecting the motor with an automatic door

TELEPHONE BOOTH WITH VENTILATOR

switch the ventilator may be made to operate only when the door is closed. The blower is designed to be installed on top of the booth with its outlet and diffuser extending through a hole into the booth. Exhaust air may be permitted to escape through wall slots insulated with felt pads to exclude noise.

Weighing Apparatus with Illuminated Scales

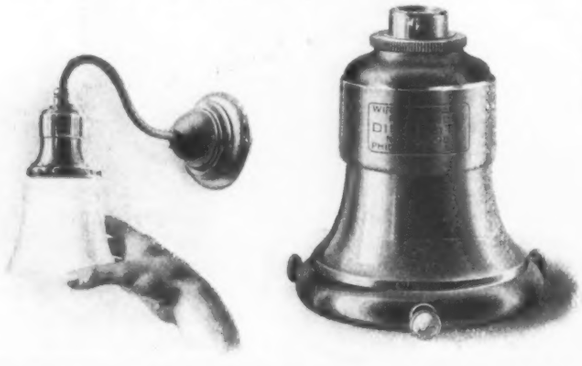
Weighing machines with advertising panels and weight and price-indicating scales which are electrically illuminated when anything is placed on the weighing platforms are being manufactured by the Angldile Computing Scale Company, Elkhart, Ind. The lamp is

ELECTRICALLY LIGHTED WEIGHING MACHINE

controlled by contact springs which close the circuit the instant the weighing beam is deflected. With this arrangement the scale mechanism carries no current and its sensitivity is not affected as the springs do not touch the balance beam after it has moved from its zero position. The advertising panel, which is lighted from the interior, may be used to feature any special article being sold or the name of the merchant. The weight-indicating scale is illuminated by a bracket lamp concealed by a reflector, while the price-indicating scale is lighted by a long tubular shade having a lamp in each end.

Lamp with Dimming Device

A lamp equipped with a dimming device by means of which 5 deg. of light intensity can be obtained is shown in Fig. 1. The dimming device is fastened to the fixture stem with thread and set-screw and is designed particularly for use in hotels and other public places where the lamp is liable to be stolen. The dimming is effected by means of helically wound resistance coils connected to contact bars. The resistor drum shown in Fig. 2 is 1.5 in. in diameter and 1 in. long. No key or chain is used with this fixture. The various degrees of light are obtained by turning the shade, which is so connected to the dimming device that as the shade is moved the resistor drum is rotated and the point of contact is moved from one commutator bar to the next. This device is made by the Wirt Company, Philadelphia, Pa.



FIGS. 1 AND 2—LAMP WITH DIMMING DEVICE ATTACHED

Tool-Handle Switch

A push-button snap switch which can be attached to the handles of portable tools and electric devices such as vacuum cleaners is being manufactured by the Cutler-

FIG. 1—TOOL-HANDLE SNAP SWITCH

Hammer Manufacturing Company, Milwaukee, Wis. The switch has two push-buttons placed diametrically opposite each other with the switch mechanism inclosed

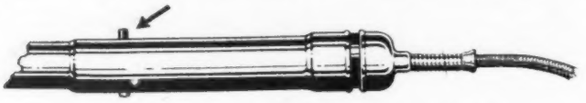
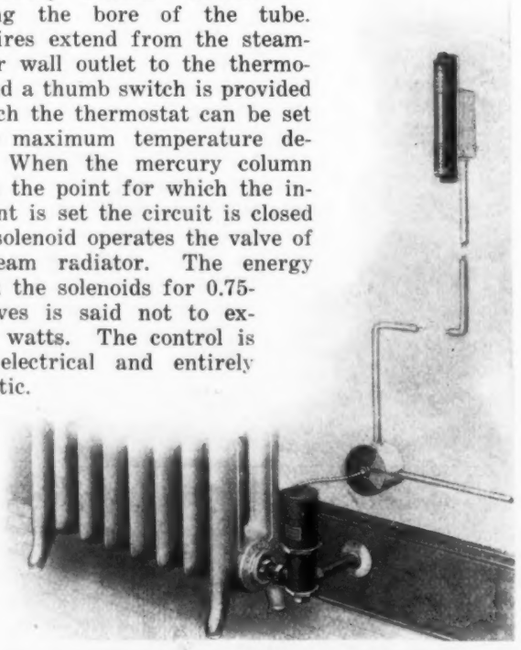


FIG. 2—SWITCH ATTACHED TO HANDLE

in a fiber cylinder 1 in. in diameter. One of the push-buttons is made of light material and the other is colored dark to designate the make-and-break buttons.

Electric Temperature Regulation

The electric temperature-control system illustrated herewith is made by the Railway Utility Company, 226 South LaSalle Street, Chicago. The thermostat consists of a mercury thermometer with a glass tube mounted in a metal case. It is fastened to a flush wall outlet box. Platinum contact points are fused into the glass, one near the bulb and others at specified temperature points in the tube. These terminals make contact with the mercury column without obstructing the bore of the tube. Two wires extend from the steam-radiator wall outlet to the thermostat, and a thumb switch is provided by which the thermostat can be set for the maximum temperature desired. When the mercury column reaches the point for which the instrument is set the circuit is closed and a solenoid operates the valve of the steam radiator. The energy used in the solenoids for 0.75-in. valves is said not to exceed 6 watts. The control is solely electrical and entirely automatic.



ELECTRIC TEMPERATURE-CONTROL SYSTEM

Jobber, Dealer and Contractor

Missouri Supply Dealer Optimistic About Future

"The financial unrest has somewhat disturbed the plans of many small cities for electrical installations and for new plants," says the manager of a Kansas City (Mo.) supply house. "One town was ready for a plant, but will have to wait a while to place its bonds. Another town has its plant but is finding difficulty in selling the bonds to pay us. They offered to turn the bonds over to us, but we didn't want to go into that business. The result of this situation is that trade is a little quiet, although eventually there will be considerable to do when the money market grows easier."

Ordinances for the Licensing of Contractors and Electricians

The Board of Councilmen of Seattle, Wash., is considering the enactment of a license requiring all electricians to take out licenses and to file bonds of $1,000. Except for duly appointed apprentices, no person less than twenty-one years of age is to be allowed to supervise or install electrical work. A clause in the proposed ordinance also revises the carrying capacities of wires.

A new ordinance passed by the City Council of Kansas City, Kan., requires the examination of all electricians before they can do work in the community, but electricians who live in the city and who had worked there before the law was enacted are exempted from the examination. Electricians of the Kansas community's big Missouri neighbor across the Kaw insist, however, that the examination is too difficult, and declare that the law operates to exclude them from securing employment and contracts on the Kansas side, although most of the resident Kansas City (Kan.) electricians now make, or have in the past made, their living from employment by Kansas City (Mo.) firms. The legality of the new Kansas City (Kan.) ordinance may be contested.

Taking the Cheerful Point of View

Under the title "We're Optimistic," the editor of the *Northwestern Buzzer* has written a cheerful article showing the silver lining of the war cloud, taking the attitude of the electrical jobber. The *Buzzer* is the organ of the Northwestern Electric Equipment Company, of St. Paul, Minn. Below we quote in part the article to which reference is made:

"With war-time prices for grain and a marvelous crop, together with a better feeling throughout the country, the prospects for business are wonderfully bright. Prosperity is still on the job, thank you, and all the live ones are up and doing. With the shortening days, the end of vacations, the evenings indoors, comes the lighting harvest. People who once thought the coal-oil lamp a luxury have become so accustomed to electricity that to do without it would be a hardship. They are accustomed to electric light. Why not educate them to electric cooking and the use of other appliances? Women are becoming modernized, demanding the vote, invading business, but they are in a century-old rut so far as household methods go. How long would men do housework in the old way—wash on a washboard or with a hand machine, sweep by hand, etc.? 'Not long' is right! Women are awakening to their rights. Why not educate them to know that electric methods are just as much their right in the home as their husband's in factory or office? Business is good; it can be made better by those who go after it. . . . All of which means, Let's go get it."

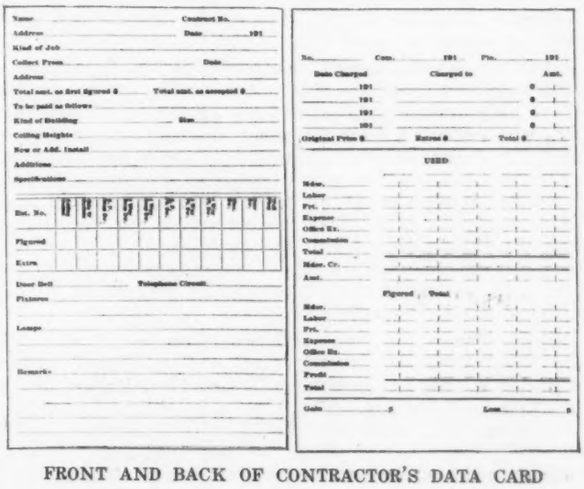
Overhead Expense and Cost Accounting

Overhead expenses were considered in detail at the last meeting of the Louisville (Ky.) Electrical Clearing House Association, which was held in the club rooms of the organization in the offices of the Kentucky Actuarial Bureau, Starks Building, Louisville. Mr. Frank A. Good, electrical engineer for the F. A. Clegg Company, was the principal speaker and devoted a large part of his talk to emphasizing the importance of the adoption of proper cost-accounting methods by electrical contractors. Instances which he cited showed that through failure to include the proper charge for overhead expenses contractors have frequently actually lost money on jobs that had seemed at first sight profitable.

Several technical matters relating to underground work were also considered, and it was said that definite regulations governing this class of construction will be adopted at the next meeting of the association.

Contractor's Data Card as Aid in Making Estimates

No contractor who buys shrewdly and estimates accurately is likely to fail in his business. In order to have available information upon which to base accurate estimates, the Home Electric Construction Company, Macomb, Ill., has designed the data card shown herewith. Blank spaces on both sides are to be filled in with desirable information regarding former contract jobs, beginning with the name and address of the customer and ending with a notation of the percentage of gain or loss at which the work was finally finished. All items of labor and material have been divided in making up the card, so that the cost information, taken together with data on working conditions, can be used to discover where mistakes have been made in estimating if the contract finally shows that a loss has been sustained.



FRONT AND BACK OF CONTRACTOR'S DATA CARD

Mr. W. I. Savidge, president of the Home Electric Construction Company, declares that with these cards filed alphabetically under customers' names many mistakes in estimating can be avoided by reference to a card describing a similar job.

Industrial and Financial News

Public Utility, Commercial, Corporate and Trade Developments—The Electrical Material and Security Markets

Change in Westinghouse Directorate.—Mr. J. J. Hanauer, of Kuhn, Loeb & Company, has been elected a director of the Westinghouse Electric & Manufacturing Company to take the place of Mr. Paul M. Warburg, who has resigned because of his recent appointment to the Federal Reserve Board. Mr. T. P. Gaylord has also been appointed acting vice-president of the company to take the place of Mr. H. D. Schute, who has been made treasurer.

Brilliant Sign Company's Factory Damaged by Fire.—The Brilliant Sign Company, of 420 North Eighth Street, St. Louis, recently suffered a considerable loss by fire. One estimate placed the loss on building and contents at $20,000. The factory was almost entirely destroyed, but the office was not seriously damaged. The factory will be rebuilt, and the company is continuing its sign service without interruption. Mr. Frederic A. Kehl, president of the company, was away on vacation at the time of the fire and was forced to make a hurried return to St. Louis.

Link Belt Company Buys Property.—The Link Belt Company, of Chicago, has purchased the block of land in that city bounded by Thirty-eighth Place, Princeton Avenue, West Thirty-ninth Street and Stewart Avenue, the reported consideration being $95,000. The company makes elevating and conveying machinery, and its present plant is at West Thirty-ninth Street and Stewart Avenue, opposite the property just acquired. The land purchased offers the only contiguous site for an extension of the business. It is said that the property has been purchased more for future needs than for immediate use by the new owner.

Electric Company's Exhibit at Foundrymen's Convention.—The General Electric Company will have on display at the Foundrymen's Convention in the International Amphitheater, Chicago, Sept. 5-11, an arc-welding outfit designed for use in the foundry and machine shop. The apparatus is of the portable type and consists of a 10.5-kw motor-generator set and a panel mounted on a truck. A centrifugal compressor operated by a 30-hp induction motor will also be shown. This compressor has a capacity of 4,500 cu. ft. per minute and is designed to deliver air at a constant pressure, making it suitable for blowing air in cupolas.

Ball-Bearing Company Unhampered by War Conditions.—Although until recently the major portion of the product of the Hess-Bright Manufacturing Company, Philadelphia, Pa., was imported from Germany, the sudden cessation of shipping on account of the war in Europe has not materially affected the company's business. Fortunately, when the war started a good half million bearings were on hand. This supply, in addition to the output of the Hess-Bright plant in Philadelphia, which will be enlarged, it is declared, to make up for the dearth of the German output, will enable the company to take care of all orders likely to be received in the near future.

Steam Power Stations.—An attractive second edition of the booklet "Steam Power Stations," published by the Stone & Webster Engineering Corporation, Boston, Mass., has just been printed. The booklet is designed to fit the coat pocket and contains photographs and drawings selected from a score of plants designed and constructed by the organization during the last few years. The installed capacity of these plants aggregates about 165,000 kw, and the views included cover stations of public utility companies and private owners located in the West and South and in New England. With the views of each station are tabulated the essential features of its structural, steam and electrical equipment.

Texas Power Company Closes $3,000,000 Contract.—The Texas Power & Light Company, whose "transmission district" is described on a preceding page of this issue, has closed a contract with the Texas Traction Company to furnish energy to operate the latter's railway system and has leased the McKinney (Texas) power plant of the railway company. The contract covers the sale of $100,000 worth of energy annually for thirty years. Lines will be constructed connecting the present "transmission district" with the northern group of cities served by the Texas Power & Light Company. Construction will also be begun soon on the new power plant for the latter company on the Oklahoma bank of the Red River.

Manufacturer of Boiler-Tube Cleaners Enlarges Plant.—The Lagonda Manufacturing Company, Springfield, Ohio, maker of cleaners for boilers, condensers and economizers, is building an addition to its plant. The new structure will be 110 ft. long by 60 ft. wide, of brick and concrete construction, with a steel-supported slate roof. The Lagonda company is enjoying a wave of prosperity and reports that its volume of business for the past two months has been greater than it has experienced for years. In addition to the former equipment, a 34-in. Gisholt automatic lathe, a large multiple drill and a radial drill will be installed. A 10-ton electric crane with a span of 36 ft. will run the entire length of the building and over the railroad siding. A 100-hp gas engine will also be added to the power equipment.

Southwest Electrical Conditions Unaffected by War.—Voicing his belief in the early return of normal business conditions in Texas and the Southwest, Mr. J. F. Strickland, of Dallas, Tex., president of the Texas Power & Light Company, the Texas Traction Company and the Southern Traction Company, declared in a recent interview that Texas has nothing to fear from the ultimate outcome of European complications. "Our future does not rest with them—theirs seems to depend rather upon our own farm productions. In a short time they must have what we raise, and then a tide of prosperity is coming to the South, and to Texas especially. Speculation for the moment may cease, but normal business and the wage earner still walk hand in hand and can more than hold their own and uphold American prosperity. It seems that within thirty or sixty days business scares will cease."

New Generating Station Site for Commonwealth Edison Company in South Chicago.—Announcement has just been made of the purchase by the Commonwealth Edison Company, two or three years ago, of 24 acres of land in South Chicago. Ultimately this site will probably be the location of a large generating plant to serve the southeastern part of the Chicago district. The new station will be situated on the Calumet River, which is the commercial highway for water-borne commerce in the southern part of Chicago and will also be strategically situated for railroad transportation. South Chicago is a manufacturing region and the demand for electricity is pretty sure to increase in that part of the city. It has also been assumed that the proposed generating plant would be conveniently situated in case the steam railroads in that part of Chicago desired to equip their passenger service for electrical operation. However, Mr. Samuel Insull, president of the Commonwealth Edison Company, is quoted as saying that his company has no contract with steam-railroad companies to supply electrical energy for the operation of trains. He says that the location of the new plant has nothing to do with the suggested electrification of the railroads, but is simply a part of the general engineering plans of the company to establish generating stations in advantageous locations in different sections of the city. Of course, the plant will be there for railroads and others to avail themselves of its resources if desired.

Central-Station Returns for June from the Atlantic States.—In our issue of last week it was shown that the seventy-five companies in the Atlantic States which reported to the *Electrical World* gave an 8 per cent increase in gross income from the sale of energy, the actual increase being from $5,670,820 in May, 1913, to $6,121,907 in May, 1914. The same companies gave an increase in total energy output in kilowatt-hours of 7.8 per cent. At the present writing, the *Electrical World* has received returns for June from seventy-three companies operating in the Atlantic States. The gross income from the sale of energy for these companies for June, 1913, was $5,714,626, and for June, 1914, was $6,053,310, or an increase of 5.8 per cent. The output for the same companies was 220,881,104 kw-hr. in June, 1913, and 244,490,516 kw-hr. in June, 1914—an increase of 10.7 per cent. These results, however, are not strictly comparable since returns from some large companies were received for June which were not received for May, and also because some six or seven small companies which reported for May did not report for June. Nevertheless, a substantial increase is still shown in both gross income and output. Included in these returns are companies operating in New York, Philadelphia, Pittsburgh, Newark, Washington, Baltimore and Atlanta. In each case June, 1914, showed substantial increases over June, 1913. In May, however, one of the large companies which operates in the city of New York reported a slight increase in revenue and a considerable decrease in output. The fifteen companies which gave us figures from the State of New York showed an increase in gross revenue of 2.6 per cent for June, 1914, over the same period in 1913, and also showed an increase of 5 per cent in kilowatt-hour output. With one exception all of these companies gave an increase in earnings and output. The one exception was a small company in the central part of the State whose monthly output is in the neighborhood of 250,000 kw-hr. This company increased its earnings by 5.6 per cent, but at the same time had a decrease in output of 2 per cent. Table I shows the figures received by the *Electrical World* from twenty-one central-station companies, operating in New York, Pennsylvania and New Jersey, for four months. These results are strictly comparable and represent over 60 per cent of the central-station industry in the three Middle Atlantic States. While there seems to be a discrepancy owing to the increasing percentage in output and decreasing percentage in earnings, it must be remembered, as was stated above, that one of the largest companies showed a gain in May revenue but a decrease in May output. All of the companies in the Middle Atlantic States which reported for June—forty-one in number—bore out the figures in Table I, namely, an income increase in the neighborhood of from 4 to 5 per cent and an output increase in the neighborhood of 9 per cent. When we come to the South Atlantic States we find that a much healthier condition exists. The income percentage increases are more than double what they were for the Middle Atlantic States. The figures in Table IV are strictly comparable, and while they do not represent a very large percentage of the entire industry, they nevertheless represent the operations of companies in nearly all of the cities of any size in the South Atlantic States. Table V gives the complete returns, so far received, from thirty-two companies operating in the South Atlantic States. They, it will be noticed, bear out in every way the returns received from the three metropolitan cities of Baltimore, Washington and Atlanta and also the returns received from twenty-one companies operating in the same region. In view of the retrenchment of many of the Atlantic manufacturers during June, the above returns must be considered as exceedingly satisfactory. Moreover, during the

TABLE I—MIDDLE ATLANTIC STATES—COMPARATIVE INCOME AND OUTPUT FOR MARCH, APRIL, MAY AND JUNE, 1914 AND 1913, FOR TWENTY-ONE CENTRAL-STATION COMPANIES

	Gross Income from Sale of Energy			Total Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March	$5,167,922	$5,054,575	2.3	196,185,860	184,210,326	6.6
April	5,272,312	4,872,534	8.2	188,159,631	172,782,703	9.0
May	4,912,282	4,579,306	7.3	179,108,858	169,399,673	6.1
June	4,616,436	4,434,922	4.0	172,773,683	159,660,960	8.3

TABLE II—MIDDLE ATLANTIC STATES—INCOME AND OUTPUT FOR MARCH, APRIL, MAY AND JUNE, 1914 AND 1913, OF CENTRAL STATIONS REPRESENTING OVER ONE-HALF OF ENTIRE INDUSTRY OF NEW YORK, NEW JERSEY AND PENNSYLVANIA

	Gross Income from Sale of Energy			Total Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March (25 companies)	$5,603,720	$5,282,154	6.1	210,843,247	196,343,544	7.5
April (31 companies)	5,769,418	5,257,092	9.8	209,156,581	189,904,240	10.1
May (40 companies)	5,406,135	5,058,371	6.8	191,412,268	181,477,734	5.5
June (41 companies)	5,052,496	4,818,956	4.9	189,600,922	173,342,427	9.3

TABLE III—SOUTH ATLANTIC STATES—COMPARATIVE INCOME AND OUTPUT FOR MARCH, APRIL, MAY AND JUNE, 1914 AND 1913, FOR THREE LARGE METROPOLITAN COMPANIES (WASHINGTON, BALTIMORE AND ATLANTA)

	Gross Income from Sale of Energy			Total Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March	$642,658	$579,850	10.9	33,860,568	25,912,792	30.8
April	604,065	537,670	12.3	32,426,161	24,827,942	30.6
May	574,160	520,981	10.2	32,374,370	25,276,426	28.0
June	552,289	496,641	11.4	30,741,878	25,359,414	14.7

TABLE IV—SOUTH ATLANTIC STATES—COMPARATIVE INCOME AND OUTPUT FOR MAY AND JUNE, 1914 AND 1913, FOR TWENTY-SEVEN COMPANIES

	Gross Income from Sale of Energy			Total Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
May	$969,643	$877,704	10.4	50,009,426	42,114,509	18.7
June	925,194	830,081	11.4	50,346,379	42,900,993	17.2

TABLE V—SOUTH ATLANTIC STATES—COMPLETE RETURNS RECEIVED BY ELECTRICAL WORLD FOR THE MONTH OF JUNE, 1914 AND 1913, FOR INCOME AND OUTPUT

Gross Income from Sale of Energy			Total Energy Output in Kw-hr.		
June, 1914	June, 1913	Per Cent Increase	June, 1914	June, 1913	Per Cent Increase
$1,000,814	$895,670	11.6	54,889,594	47,538,677	15.5

last twelve months many of the companies reporting to us have had to make a revision downward of their rate schedules. Had the old rates been maintained in each case, the June income percentage increase would have been larger. This, of course, is particularly true of the Middle Atlantic States.

Mine Orders for Electrical Equipment.—The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., reports the receipt of the following orders for mine apparatus: Anaconda Copper Mining Company, Butte, Mont., eight 150-hp, fourteen-pole motors, with impregnated windings, to be operated in couples of 300 hp, for driving quintuplex mine pumps, each complete with automatic autostarter composed of type F magnetic switches and six relays mounted on slate panel, separately mounted autotransformers, two 8-ton bar-steel locomotives and one 75-kw motor-generator set and switchboard; Daly West Mining Company, Park City, Utah, one 175-hp, sixteen-pole motor with magnet-switch hoist control, and one 400-hp, 150-r.p.m. synchronous motor with exciter and switchboard, for driving a Laidlaw-Dunn-Gordon air compressor; Utah Copper Company, Magna, Utah, four 10-hp special vertical motors for driving agitators for oil flotation; Utah Copper Company, Bingham, Utah, six 1-kw turbo-generator units, to be used for supplying light to steam shovels operating in the mine, each turbine being bolted directly to the shovel frame and supplied with steam from the shovel boiler; Yukon Gold Company, Idatrod, Alaska, six 125-kva oil-insulated, self-cooled transformers; Jualin Alaska Mines Company, Jualin, Alaska, one 100-kva waterwheel generator, three 25-kva transformers, one 75-hp motor and one two-panel switchboard; Kennecott Mines Company, Kennecott, Alaska, one 75-hp special motor with magnet brake and automatic control, to be used to drive a tramway and under certain conditions to be operated as an asynchronous generator; one 500-kva, 80 per cent power-factor, 480-volt, three-phase, sixty-cycle normal rated turbo-generator unit and one two-panel switchboard; Alaska Treadwell Gold Mining Company, Treadwell, Alaska, one 4.5-ton storage-battery locomotive, 25-in. gage, with 2 V-50 motors and 68 cells of Edison type A-8 Battery, one 8-ton bar-steel trolley locomotive, 25-in. gage, with No. 905 500-volt equipment, steel-tired wheels and D-20 trolley, and one No. 354 200-hp, 2200-volt motor, with magnet-switch control for automatic acceleration; Beaston Copper Company, Latouche, Alaska, two 625-kva, 80 per cent power-factor, 2300-volt, three-phase, sixty-cycle normally rated turbo-generator units, one six-panel switchboard and two 16-kw motor-generator exciter sets; Tonopah Merger Mining Company, Tonopah, Nev., one 250-hp, 200-r.p.m. synchronous motor with switchboard panel and motor-generator set for driving a Sullivan machinery compressor; Tonopah Belmont Development Company, Tonopah, Nev., one 125-hp motor for direct connection to a Nordberg mine hoist and one 75-hp motor for direct connection to an Aldrich pump; Burro Mountain Copper Company, Burro, N. M., four 300-kva, six 100-kva and three 375-kva oil-insulated, self-cooled transformers; United Verde Copper Company, Jerome, Ariz., three 300-kva and three 30-kva oil-insulated, self-cooled transformers.

NEW YORK METAL MARKET PRICES

	Aug. 18		Aug. 25	
Copper	Bid	Asked	Bid	Asked
Standard spot*	.....	.....	.....	.....
	Selling Prices		Selling Prices	
	£ s d		£ s d	
London, standard spot*	... ...		... ...	
Prime Lake	12.50 to 12.62½†		12.50 to 12.75†	
Electrolytic	12.25 to 12.37½†		12.25 to 12.37½†	
Casting	12.10 to 12.20†		12.15 to 12.25†	
Copper wire base	13.75 to 14.00		13.75 to 14.00	
Lead	3.90		3.90	
Nickel	40.00 to 45.00		40.00 to 45.00	
Sheet zinc, f.o.b. smelter	7.25		7.50 to 8.00	
Spelter, spot	5.75 to 5.85		6.10 to 6.20†	
Aluminum	20.00 to 21.00		20.00 to 21.00	

***COPPER EXPORTS**

Total tons to Aug. 25 15,404

*From daily transactions on the New York Metal Exchange.
†Nominal.
NOTE.—The New York Metal Exchange and the London Metal Exchange have been closed until further notice. No reliable quotations on old metals can be obtained for the present. There is no buying in this market.

Corporate and Financial

American Cities Company.—Mr. Howard S. McNair, formerly secretary to the president, has been elected secretary and treasurer of the American Cities Company of New York to succeed Mr. R. E. Slade, whose resignation was recently announced.

New York Bankers' View of War Situation.—The New York banking firm of William P. Bonbright & Company in its *Fortnightly Review* has the following to say in regard to the present situation: "The normal requirements of American towns and cities for light and heat will not be lessened by war in Europe. Uncertainty as to the effects on some industries is natural, but the investor in companies supplying electricity and gas to American communities may safely repose confidence in the earning power whereon his interest or dividends depend."

Washington-Oregon Corporation.—A committee consisting of Messrs. Clarence M. Brown, J. Crosby Brown, of Brown Brothers & Company, Philadelphia; James D. Winsor, Jr., of Thomas A. Biddle & Company, and Lawrence J. Morris, of Morris, Johnson & Company, has been formed and is requesting deposits of the first and consolidated mortgage twenty-five-year gold 6 per cent bonds of the Washington-Oregon Corporation of Vancouver, Wash., due April 1, 1916. The company defaulted on the interest due April 1 last, and interest due July 1 last also remains unpaid. The authorized bond issue of the company is $5,000,000, of which $1,563,500 is outstanding. The Fidelity Trust Company, of Philadelphia, is trustee.

Boston Bankers' View of Present Situation.—The Boston banking firm of C. D. Parker & Company, Inc., in its August number of *Facts and Figures* makes the following statement: "War and business uncertainties do not stop the growth of the gas and electric light companies. The ability of the countries of Europe to furnish manufactured goods and other necessities of life has been greatly reduced and in many cases practically suspended; the world must then depend to a great degree upon the manufacturers and producers of this country. To keep this worldwide market supplied, our factories and producers will be taxed to the limit. This means the consumption of a greater amount of electricity for power and light. Gas and electric light companies have been particularly free from labor and political agitations and business depressions, and in times of business uncertainty such as are now prevalent show a steady and continuous growth."

Pacific Coast Company Defers Dividends.—The directors of the Portland (Ore.) Railway, Light & Power Company have decided to pay no dividend Sept. 1. They state that the surplus available for dividends has been steadily decreasing for the last two years and that now, when they thought they had overcome all the difficulties, they have the financial troubles of war times to contend with. The status of the company is fully given in a letter sent out to the stockholders by Mr. C. M. Clark, president of the company, in part as follows: "In ordinary times the finances of the company can be readily handled. At the present time, however, the company is not faced with ordinary conditions. The European war has brought about a situation throughout the civilized world for which we have no precedents, and it is impossible as yet to form opinions of any value concerning its immediate or permanent effect. Under present conditions any estimate of the immediate future is mere guesswork. Under these circumstances the interests of the stockholders require that the company should conserve its cash resources so as to be prepared for any eventuality, and the directors have accordingly determined to pay no dividend on the first of September, 1914. The directors hope for an early resumption of dividends, but this depends upon a return to normal conditions. Problems forced upon this country by the terrible situation in Europe are being solved and the return of business activity in many lines may be rapid. The competition in the light and power business in Portland has had little effect on our earnings, the greatest decreases being on the street-railway lines. The future, therefore, depends upon the effect of the European situation on the trade and industry of this country, and that may be determined in the near future."

Business Notes

The Best Electric Company, of Pittsburgh, Pa., has moved its quarters to Fifty-first Street and Sarah Street.

The Hart & Hegeman Manufacturing Company, Hartford, Conn., has become the exclusive selling agent for the H. T. Paiste Company, Philadelphia, Pa.

The Barnes & Kobert Manufacturing Company, formerly of New Haven, Conn., has moved to Milldale, Conn., where it has opened up a new office.

The Thompson Electric Company, Cleveland, Ohio, has changed its address from 102 St. Clair Avenue, N. W., Cleveland, Ohio, to 5606 Euclid Avenue, Cleveland.

The General Elevator Company.—Mr. W. N. Dickinson, formerly with the Otis Elevator Company, is now connected with the General Elevator Company, 29 Broadway, New York City.

The Defiance Manufacturing Company, Summerdale Station, Philadelphia, announces that it is in a position to furnish manufacturers with parts of machines or whole machines, jigs, tools and dies.

The Reliance Electric & Engineering Company, Cleveland, Ohio, has appointed John Z. Kelly as its New York sales representative, with offices at 90 West Street, New York City. Mr. Kelly was formerly a member of the New York office of the Westinghouse Electric & Manufacturing Company.

The C & C Electric & Manufacturing Company, Garwood, N. J., has opened a branch sales office in the Security Building, Minneapolis, Minn. R. L. Wells will be in charge of this office. The Detroit office of the company has been moved from 144 Seyburn Avenue to Room 1111, Chamber of Commerce Building, Detroit. This office is in charge of R. K. Slaymaker.

New Industrial Companies

The Standard Plunger Elevator Company, of Worcester, Mass., and New York, N. Y., has been incorporated with a capital stock of $750,000. The officers are: A. B. Burgess, of Worcester, Mass., president, and L. G. Hagenbach, of New York, N. Y., treasurer.

The Somerset Electric Company, of Boston, Mass., has been incorporated by J. J. Hurley, of Somerville, Mass.; A. J. Shepard and F. M. Hill, of Saugus. The company is capitalized at $50,000 and purposes to manufacture and deal in steam and electrical specialties.

The Consolidated Engine Stop Company, of New York, has been incorporated with a capital stock of $120,000 to manufacture and deal in electrical devices, tools and machinery. The incorporators are A. W. Britton, T. S. Buckingham and W. P. Powell, 37 Wall Street, New York, N. Y.

The Evolution Phone Company, of New York, N. Y., has been incorporated with a capital stock of $25,000 by Thomas E. Styles, 10 Hedges Place, Jamaica; Herman G. and Ida B. Pape, 54 Bank Street, New York, N. Y. The company will manufacture and deal in electrical and mechanical devices.

The Dart Motor Truck Company has filed articles of incorporation under the laws of the State of Delaware with a capital stock of $600,000. The incorporators are C. W. Hellen and W. Galloway, of Waterloo, Ia., and C. C. Wolf, of Parkersburg, Ia. The company intends to manufacture and deal in motor trucks.

The O'Connor Spiral Pump & Boiler Company has filed articles of incorporation under the laws of the State of Delaware. The company is capitalized at $50,000 and purposes to manufacture pumps, blowers, engines, motors, etc. The incorporators are T. O'Connor, A. E. Macatee and B. Macatee, of Philadelphia, Pa.

The American Rotary Power Company, of Portland, Maine, has filed articles of incorporation under the laws of the State of Maine. The company is capitalized at $1,000,000 and will manufacture and deal in all kinds of machinery to generate and supply electricity. B. Thompson, of Portland, is president and treasurer.

Trade Publications

Linemen's Tools.—The Dicke Tool Company, 61 Broadway, New York City, has issued a catalog on linemen's tools for construction work.

Dish Washer.—An electric dish washer is described and illustrated in a catalog prepared by the Walker Brothers Company, Syracuse, N. Y.

Magnet Wire.—A price list of magnet wire is being sent out by the Boller Insulated Wire Company, 122 North Curtis Street, Chicago, Ill.

Electric Hot Pad.—An aluminum electric hot pad is the subject of a folder sent out by the Hotpoint Electric Heating Company, Ontario, Cal.

Insulating Materials.—Various kinds of insulating substances are described in a booklet published by the Dielectric Company, St. Louis, Mo.

Storage Batteries.—Storage batteries for electric vehicles are described in a catalog published by the Titan Storage Battery Company, Newark, N. J.

Lighting Fixtures.—R. Williamson & Company, West Washington and North Jefferson Streets, Chicago, Ill., have issued a catalog describing lighting fixtures.

Portable Power Table.—Directions for operating a portable power table are given in a booklet issued by the Federal Sign System (Electric), Chicago, Ill.

Pumping Machinery.—Various kinds of steam and power pumps are described in an attractive bulletin issued by the National Transit Company, Oil City, Pa.

Search-Lamp Projectors.—These are described and illustrated in an attractive eighty-eight-page catalog issued by the Carlisle & Finch Company, Cincinnati, Ohio.

Magneto Telephones.—The Western Electric Company, New York, has issued a forty-page catalog in which are described magneto telephones and auxiliary apparatus.

Charging Plugs and Receptacles.—These are described and illustrated in Bulletin No. 29, issued by the Albert & J. M. Anderson Manufacturing Company, Boston, Mass.

Porcelain Enameled Signs and electric-lighted mountings therefor are described in a new catalog issued by the Royal Enameling Company, 326 West Madison Street, Chicago.

Push-Button and Rotary-Switch Boxes.—Push-button and rotary-switch boxes are described and illustrated in a leaflet issued by the V. V. Fittings Company, Philadelphia, Pa.

Regulators.—Regulators for alternating-current and direct-current generators are described in a folder issued by the Thompson-MacArthur Regulator Company, Buffalo, N. Y.

Telephone Cords.—Telephone cords and the uses to which they are put are described in a sixteen-page illustrated catalog prepared by the Western Electric Company, New York.

Ball Bearings.—An attractively illustrated catalog, issued by the Hess-Bright Manufacturing Company, Philadelphia, Pa., describes uses to which ball bearings are put in machine-tool work.

Diesel Engines.—Diesel engine installations in the Anheuser-Busch brewery and other plants are described in a bulletin published by the Busch-Sulzer Brothers Diesel Engine Company, St. Louis, Mo.

Hydraulic Turbines.—The turbine installation in the plant of the Duck River Power Company, Shelbyville, Tenn., is briefly described in a bulletin issued by the Trump Manufacturing Company, Springfield, Ohio.

Opportunities of Young Men in Electrical Field.—"The Young Man and the Electrical Industry" is the title of a descriptive article written by James H. Collins and published by the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Molded Insulation.—A circular has been issued by the Condensite Company of America, Glen Ridge, N. J., describing the properties of so-called condensite, a molding material for insulating purposes, and also enumerating the various uses to which it can be put.

Personal Mention

Mr. E. F. Woodruff has been made manager of the Fort Stockton (Tex.) Light & Power Company as successor to Mr. R. B. Dudley.

Mr. Charles Selby has been appointed superintendent of the municipal lighting plant at St. Mary's, Ohio, succeeding Mr. Albert Buehler.

Mr. William Ross has succeeded Mr. Ralph R. Couper as superintendent of the municipal electric plant at Scott, Saskatchewan, Canada.

Mr. E. L. Hopkins, formerly of Manistee, Mich., has been appointed superintendent of the lighting plant at Niles, Mich., to succeed Henry Fogus.

Mr. C. Johnson has been elected vice-president of the Capital Light & Power Company, Jackson, Miss., as successor to Mr. O. F. Whitehurst.

Mr. J. T. Woodward has resigned as manager of the Lancaster (S. C.) Light & Power Company and has entered the contracting business in Lancaster.

Mr. Foster Hannaford has succeeded Mr. D. McAfee as acting general superintendent of the Galesburg (Ill.) Railway, Lighting & Power Company.

Mr. H. C. Cox, of Toronto, Ontario, has been elected a director of the Canadian General Electric Company, in place of his brother, the late E. W. Cox.

Mr. Edward Hansman has succeeded Mr. J. C. Sexton as superintendent and chief engineer of the municipal water and electric plant at Grayville, Ill.

Mr. H. C. Neal has resigned as superintendent of motive power and overhead construction with the Jackson (Miss.) Light & Traction Company.

Mr. Charles J. Crump, until recently secretary and general manager of the Marine (Ill.) Light & Ice Company, has sold out his interest in that company.

Mr. Charles A. Worthington has succeeded Mr. George Whitehead as manager and superintendent of the municipal electric plant at Schoolcraft, Mich.

Mr. L. W. Irwin, formerly vice-president of the Greenville (Ky.) Light & Water Company, has succeeded Mr. W. A. Wickliffe as president of the company.

Mr. John I. Beggs has been elected president of the Southern Illinois Railway & Power Company, Harrisburg, Ill., as successor to Mr. F. R. McMullin.

Mr. Paul Bond has been appointed chief power plant engineer of the Bloomington (Ill.) & Normal Railway & Light Company as successor to Mr. C. Schenck.

Mr. W. F. Douthirt, formerly secretary of the Sioux City (Iowa) Gas & Electric Company, has succeeded Mr. L. L. Kellogg as vice-president of that company.

Mr. John H. Gerecke has succeeded Mr. E. J. Muller as manager of the Sag Harbor Electric Light & Power Company, of Sag Harbor, Long Island, N. Y.

Mr. John V. Harding, formerly manager of the municipal electric plant at State Center, Ia., has been appointed to a corresponding position at New London, Ia.

Mr. Arthur C. Herren, formerly superintendent of the municipal plant at Tipton, Ind., has been appointed manager of the municipal electric plant at Peru, Ind.

Mr. H. U. Cooper has been appointed manager and superintendent of the municipal electric-service system at Mantorville, Minn., as successor to Mr. E. Steinbuck.

Mr. Robert Stranberg has been appointed superintendent of the Marquette County Gas & Electric Company, at Ishpeming, Mich., succeeding Mr. A. L. Brownell.

Mr. George Baldwin has been elected secretary of the Edison Sault Electric Company, Sault Ste. Marie, Mich., succeeding W. W. Edwards, recently deceased.

Mr. D. B. Neth, formerly superintendent of the United Electric Light & Water Company, Waterbury, Conn., has succeeded Mr. E. L. Gilchrist as chief engineer.

Mr. F. E. Treat, formerly superintendent of the Conneaut (Ohio) Mazda Lamp Works of the General Electric Company, has been appointed superintendent of the lamp works at Shelby, Ohio.

Mr. Ivar Lundgaard, industrial engineer with the Rochester (N. Y.) Railway & Light Company, has been elected president of the Rochester Engineering Society.

Mr. C. H. Grieser, formerly manager of the Rushford (Minn.) Power Company, has been appointed treasurer of that company, succeeding Mr. William Roberton.

Mr. Charles V. Brinkman, formerly treasurer of the Great Bend (Kan.) Water & Electric Company, has succeeded Mr. J. George Brinkman as president of the company.

Mr. Frank H. Hambleton, formerly chief engineer of the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., is reported to be safe in Switzerland at Berne. With a friend, Mr. Hambleton was taking a vacation trip in Europe when war broke out.

Mr. Heinrich Beck, of Meiningen, Germany, whose searchlamp with vapor-cooled electrodes is being tested by the United States Navy as described on page 181 of our issue of July 25, was taken a prisoner of war by the British authorities while en route to his native country, Germany, last week, and suffered the confiscation of all his searchlamp data, specifications, drawings, etc. Mr. Beck was subsequently released when his identity was proved and will return to Boston next week.

Mr. William R. McCann, supervisor in the former division of erection of the Isthmian Canal Commission, Culebra, Canal Zone, has resigned and returned to the United States. Under the direction of the electrical and mechanical engineer of the Canal Commission Mr. McCann designed the electrical transmission system of the Panama Canal, remaining until the work of installation was nearly completed. Before going to the Isthmus Mr. McCann was connected with the Commonwealth Edison Company of Chicago. Recently he has been engaged in the preparation of a thesis on the transmission system of the canal to be submitted to the University of Wisconsin for a master's degree. Mr. McCann was secretary of the Panama Section of the A. I. E. E.

Mr. William Gould, for the past eleven years in the contract and inspection department of the New York Edison Company, has become commercial manager of the Gas & Electric Improvement Company, with headquarters at 77 Franklin Street, Boston, Mass. Prior to coming to Boston Mr. Gould was manager of the bureau of special canvassers in the New York company, and during the last two years had charge successively of the unused-meter bureau, survey work, and the training of new commercial employees. In his new field Mr. Gould will direct the commercial work of central-station and gas companies in the communities whose utilities are operated by the Improvement company, including North Adams, Northampton, Arlington, Milford, Clinton, Leominster and other cities and towns in New England.

Mr. J. E. Bigham, who was chosen president of the Southeastern Section of the N. E. L. A. at its convention held at Isle of Palms, Charleston, S. C., Aug. 19 to 21, is the assistant treasurer of the Tampa Electric Company, Tampa, Fla. Mr. Bigham was born in Ohio in 1877, and after graduating from the State Normal School was employed in the construction department of the American Bridge Company, Pittsburgh, Pa., and in the operating department of the American Tin Plate Company, Pittsburgh. He served successively in the Spanish-American War and in the Philippine campaign as sergeant of the United States Volunteers and as sergeant-major on the noncommissioned staff. In 1901 Mr. Bigham entered electrical work with the Stone & Webster interests at Terre Haute, Ind. In 1906 he became assistant treasurer of the Paducah Light & Power Company, Paducah, Ky., and he was made assistant treasurer of the Jacksonville Electric Company, Jacksonville, Fla., in 1909. Since 1910 Mr. Bigham has been associated with the Tampa Electric Company as above mentioned.

J. E. BIGHAM

Construction

New England

BUCKSPORT, MAINE.—The Bangor & Aroostook R. R. Co. has closed a deal with the Penobscot Bay El. Co. for furnishing electricity for lamps and motors for all the former company's works at the Stockton terminal, which also carries the supply for the fertilizing plants and the Great Northern Paper Co.'s storehouse and dock at Cape Jellison. The railroad company has closed down its plant at Kidder's Point and has leased its wires in Searsport and Stockton Springs to the Penobscot Bay Co., which will furnish electricity from its East Orland plant.

RUMFORD, MAINE.—The Rumford Village Corporation has voted to appropriate $2,000 for improvement to the street-lighting system on Congress and Waldo Streets.

HARRISVILLE, N. H.—At a town meeting held recently the citizens voted to light the streets of the village by electricity.

MANCHESTER, N. H.—The American Duck Co., it is reported, has decided to install a new power plant at its mills. Three 750-hp boilers will be installed.

BOSTON, MASS.—The contract for furnishing electricity for the Pemberton Square court house has been awarded to the Somerset Co. for a period of five years. The company has secured contracts to furnish electricity to light several business buildings along Tremont Row.

BROOKLINE, MASS.—The Board of Selectmen has granted the Edison El. Illg. Co., of Boston, permission to install underground conduits and manholes with necessary wires and cables on several streets in Brookline.

FALMOUTH, MASS.—The Buzzards Bay El. Co., of Falmouth, has been granted permission by the State Board of Gas and Electric Light Commissioners to extend its service to the towns of Yarmouth, Dennis, Chatham, Harwich and Mashpee. The company proposes to extend its transmission lines from Hyannis to Yarmouth; also to install a small plant at Chatham, and to continue its transmission line over private right-of-way along the middle of the cape, so as to supply all of the towns named from its station in Falmouth.

SPENCER, MASS.—The Board of Selectmen has engaged William Plattmer, consulting engineer, Old South Building, Boston, Mass., to look into the street-lighting situation and to make terms with the Spencer Gas Co. for a new contract, etc.

WOBURN, MASS.—The Board of Public Works has voted to contract with the Edison El. Illg. Co., of Boston, Mass., for extension of the ornamental lighting system from the armory through the business district. All wires are to be placed underground.

BRIDGEPORT, CONN.—Contracts have been awarded for the construction of the addition to the power house of the United Illg. Co., of Bridgeport. Reported in the issue of Aug. 15 to have been granted a permit to build an addition to plant. Charles A. Paul is manager.

EAST NORWALK, CONN.—Within the next 30 days the electric light commissioners expect to erect a new power house and install two 100-hp Lewis-Roth gas engines and gas producers and a 75-kva, three-phase, 2300-volt General Electric generator. Contracts have been placed for machinery. The commissioners also contemplate the purchase of some electric irons within the next three months. E. Lingard is manager.

Middle Atlantic

ALBANY, N. Y.—Bids will be received by the Trustees of Buildings, Executive Chamber, Capitol, Albany, until Sept. 10 for construction, heating and ventilating, plumbing and electric wiring for rooms on the fifth floor of the New York State Capitol. Drawings and specifications may be consulted at the Department of Architecture, Capitol, Albany, and at the New York office of the Department of Architecture, Room 1224, Woolworth Building, New York. Complete plans and specifications and blank form of proposals will be furnished to prospective bidders upon application to Lewis F. Pilcher, architect, Capitol, Albany.

AUBURN, N. Y.—The Public Service Commission has authorized the Empire Gas & El. Co., of Auburn, to issue $137,000 in bonds, of which the proceeds of $48,506 will be used for overhead lines, underground conduits and cables, street-lighting equipment, transmission lines and equipment.

HANNAWA FALLS, N. Y.—Work has begun on rebuilding the dam of the Hannawa Falls Wtr. Pwr. Co., at Hannawa. The cost of the work is estimated at $40,000.

LANCASTER, N. Y.—The Lancaster & Depew Lt., Pwr. & Conduit Co., of Lancaster, has been awarded the contract for street-lighting in West Seneca, requiring 350 arc lamps. The company was also granted a franchise to furnish electricity in West Seneca for commercial purposes.

NEW YORK, N. Y.—The New York, New Haven & Hartford R. R. Co., it is reported, is negotiating with the New York Edison Co., of New York, to supply electricity to operate the New York, Westchester & Boston Ry. Co., in order that the railroad company may operate its trains from New York to New Haven by electricity, at about 70 per cent. of full capacity. When financial and other difficulties clear up, development of the Housantonic power enterprise will enable the complete electrical operation over the entire 70-mile stretch. The Cos Cob power plant is unable to meet the increased demands of the entire electrified zone.

NYACK, N. Y.—The Public Service Commission has authorized the Rockland Lt. & Pwr. Co. to issue $463,000 in capital stock to purchase the property of the Rockland El. Co. and to pay certain outstanding indebtedness. In addition the company is authorized to acquire a controlling interest in the Rockland El. Co. of New Jersey. About 200 square miles will be served by the consolidated corporation and additional transmission and distributing lines are to be erected and also improvements made to the generating plants. The generating plants at Hillburn and Orangeburg will be connected by a new transmission line, the Hillburn plant is to be enlarged and used as the main central station, while the Orangeburg station will be held in reserve.

PORT JERVIS, N. Y.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Sept. 14 for construction, including mechanical equipment, lighting fixtures and approaches, of the United States Post Office at Port Jervis, N. Y. Drawings and specifications may be obtained at the above office or from the custodian of site at Port Jervis. O. Wenderoth is supervising architect.

CARLISLE, PA.—Experiments are being made with the new nitrogen lamps by the Carlisle Gas & Wtr. Co. in Carlisle. If satisfactory, the entire street-lighting system may be changed.

ERIE, PA.—Advertisements for applications for charters for five companies to be incorporated as the Concord, the Wayne, the Union, the Waterford and the Summit Township Power Companies have been authorized. Fred B. Hofft, Milward Oliver and Charles B. English are named as incorporators. The interests, it is said, are identical with those of the Erie City El. Lt. Co., which purposes to erect a transmission line to supply electricity in Corry, Union City, Waterford and immediate points.

JOHNSTOWN, PA.—To place its wires underground to comply with the ordinance recently passed by the City Council it will cost the Citizens' Lt., Ht. & Pwr. Co., of Johnstown, approximately $50,000. H. H. Weaver is president and general manager.

MONT ALTO, PA.—The borough of Mont Alto will not install a municipal electric-light plant for at least a year. Reported in the issue of July 25 to be considering the construction of an electric plant.

PENBROOK, PA.—The Harrisburg El. Lt. & Pwr. Co., of Harrisburg, has been awarded a contract for lighting the town for a period of five years.

PHILADELPHIA, PA.—The Pennsylvania R. R. Co. has awarded to Braun & Stewart the contract for the erection of the electric substations at Bryn Mawr and Paoli in connection with equipping the main line to the latter point for electrical operation.

PITTSBURGH, PA.—Bids are being received for electrical work in the Brashear, East Street, Larimer and Osceola Schools in Pittsburgh. Plans and specifications may be obtained on application to the superintendent of buildings, 735 Fulton Building, Pittsburgh.

PORTAGE, PA.—Bids will be received by the Portage Borough School Board until Sept. 7 for the construction of a new high school building, including heating and ventilating, plumbing and electrical work. Plans and specifications may be obtained at the office of J. E. Adams, architect, 402 Lincoln Building, Johnstown, Pa.

WILLIAMSPORT, PA.—The City Commission has engaged C. L. Kinsloe, electrical engineer, of State College, to prepare specifications for the contract for lighting the city.

ATLANTIC CITY, N. J.—Bids will be received by the Board of Commissioners of the city of Atlantic City, City Hall, Atlantic City, until Sept. 10 for furnishing 205 cast-iron lamp standards. Plans of lamp standards will be exhibited at the office of John W. Hackney, city engineer, Room 25, City Hall, and at the office of Frank Shinnen, chief of electrical bureau, Room 21, City Hall. Complete set of blue prints may be obtained upon application to the city engineer or chief of electrical bureau, for which a charge of $5 will be made.

BURLINGTON, N. J.—The Riverside Trac. Co. has been granted permission by the Board of Utility Commissioners to issue $50,000 in bonds for the erection of a new power plant in Burlington.

JERSEY CITY, N. J.—The Public Ser. El. Co. has applied to the Board of Freeholders for a franchise to erect a new pole transmission line on the Belleville Turnpike.

NEWARK, N. J.—The Passaic Valley Sewerage Commission is planning to build a new pumping station on the Newark meadows, to cost about $125,000.

SUSSEX, N. J.—The Woodburne El. Co., of Sussex, is installing a 150-hp boiler complete. A. W. Bedell is manager.

TRENTON, N. J.—Contract has been awarded by the Princeton Worsted Mill for a new power plant, two stories high, 35 ft. by 45 ft. The equipment will include a turbine engine and generator and motors, all of which have already been purchased.

BARBOURVILLE, W. VA.—Within the next 30 days the managers of the Morris Harvey College electric-light plant expect to purchase 100 incandescent lamps. P. H. Willis is president.

CHATHAM, VA.—The Pittsylvania Pwr. Co., recently incorporated, with a capital stock of $550,000, it is reported, will take over the Chatham Lt. & Pwr. Co. The new company purposes to construct a hydro-electric plant on Banister River at White Falls to develop 1500 hp for transmission to Chatham, Gretna and other towns in this vicinity. The initial installation provides for two 375-hp units, transmission line to Chatham 13 miles long, and a branch line to Gretna about 9 miles long. The cost of the plant is estimated at from $40,000 to $50,000. Plans and specifications are being prepared by B. Parks Rucker, consulting engineer, of Charlotte, N. C.

CLIFTON FORGE, VA.—Within the next six months the Virginia Western Pwr. Co., of Clifton Forge, expects to erect 50 miles of transmission lines and several substations. A. C. Ford is manager.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Sept. 1 for furnishing at the various navy yards and naval stations supplies as follows: Washington, D. C., Schedule 7182—10,250 rubber gaskets, to be in one piece, 222,800 lb. sheet zinc; Schedule 7183—11,000 lb. black soft steel, 1¼ in. by ⅛ in., with half-round edges, 109,700 lb. sheet steel. Newport, R. I., Schedule 7183—5100 lb. annealed race ball steel. Boston, Mass., Schedule 7184—360,000 lb. round iron for manufacture of chain cables. Bids will also be received at the same place until Sept. 8, as follows: Norfolk, Va., Schedule 7196—40 No. 125 crucibles, without covers; Schedule 7189—frog, plate switch points and portable climbing switch (one each); Schedule 7193—five 2-mfd condensers, two ringing dynamotors, 120-volt motor and spare parts, one C-72, front-connection-type telephone switchboard and spare parts, 67 telephones, types HB, D, DB, HBC, and spare parts; Schedule 7196—miscellaneous screwed, low-pressure, rough standard, composition pipe fittings, miscellaneous screwed, low-pressure, standard, galvanized and black, malleable-iron pipe fittings. Annapolis, Md., Schedule 7186—one condensing plant complete. Washington, D. C., Schedule 7192—54,000 ft. two-conductor cable, 15,000 micro-incandescent lamps, 10 volts, 1-cp, 3000 ft. black wrought pipe, standard weight, 1570 lb. 2-in. I.P.S. seamless copper tubing, commercial lengths. Chelsea, Mass., Schedule 7191—one X-ray machine of the so-called interruptless type. Brooklyn, N. Y., Schedule 7195—two 11½-hp, 120-volt, 930 r.p.m. direct-current motors and spare parts; Schedule 7189—three 50-kva transformers, complete.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Washington, D. C., until Sept. 15 for furnishing at the various navy yards and naval stations supplies as follows: Gambrills, Md., Schedule 7213—one internally fired Scotch-type boiler. Brooklyn, N. Y., Schedule 7210—13 heater boxes, complete with dampers, steam and drain valves, and all necessary attachments; Schedule 7216—30 No. 80 plumbago cru-

cibles, with covers; Schedule 7218—15 portable hand, electric drills, 125 volts, ½ in. (to have two speeds); Schedule 7215—1300 lb. hard-drawn bar copper, commercial lengths; Schedule 7204—38 5-in. I-beam steel trolleys; Schedule 7228—1550 lb. ½-in. and 2-in. copper pipe (iron pipe size). Norfolk, Va., Schedule 7208—995 soft-rubber gaskets, 8400 2-in. to 10-in. tapered steel pins, 112,000 ft. galvanized, flexible steel-wire rope (1-in. circumference and 3/16 in. diameter), 915 ft. brass tubing, 1200 ft. steel tubing, ¾ in. outside diameter, 125 mil thick, commercial lengths. Norfolk, Va., Schedule 7206—four pneumatic-geared, portable hoists, 6000 lb. to 8000 lb. capacity. Boston, Mass., Schedule 7216—400 lb. packing for condenser tubes (in 1-lb. balls). Washington, D. C., Schedule 7223—1850 lb. ¾-in. round copper rod, commercial lengths. Bids will also be received at the same place until Sept. 22, as follows: Mare Island, Cal., Schedule 7233—80 headers, "B" and "F," intermediate front and back, for Babcock & Wilcox boilers; Schedule 7234—miscellaneous mica plate, sheet and tubings. Gambrills, Md., Schedule 7236—furnishing and installing miscellaneous insulation for refrigerating plant; furnishing and installing one refrigerating and ice-making plant. Applications for proposals should designate the schedule desired by number.

North Central

DETROIT, MICH.—A large laundry will be installed in the basement of the new Statler Hotel. All machinery will be driven by electric motors.

DETROIT, MICH.—Plans are being prepared by Frank Van Tuyl, architect, 1512 Union Trust Building, Detroit, for a power plant for the Detention Home in Detroit.

DETROIT, MICH.—It is understood that a power plant will be installed in connection with the power building to be erected by the Utility Pwr. Co. on Jefferson Avenue.

DETROIT, MICH.—Bids will be received by the Department of Public Works of the city of Detroit, at the office of the Commissioners, City Hall, Detroit, until Sept. 21 for furnishing machinery and equipment for a garbage-reduction plant to be erected near the city of Detroit. Separate proposals in duplicate to be submitted for each of the following items: (A) Boilers and stokers; (B) engines and generators; (C) boiler-feed pumps; (D) feed-water heater; (E) air compressor; (F) engine room crane; (G) locomotive crane; (H) coal and ash-handling equipment; (I) repair-shop equipment; (J) green-garbage cranes; (K) conveying machinery; (L) cooking and pressing equipment; (M) grease-handling equipment; (N) evaporating equipment; (O) drying equipment; (P) percolating equipment; (Q) railroad-track scales; (R) railroad garbage cars.

GRAND RAPIDS, MICH.—The Grand Rapids Ry. Co. has applied to the City Council for permission to place its heavy voltage wires underground in the downtown district. The company proposes to carry all its wires from its power plant on Market Avenue and through Monroe Avenue to Monroe Street.

GRAND RAPIDS, MICH.—The amount necessary ($4,000) for the extension of the ornamental lighting system on South Division Avenue from Oakes Street to Bartlett Street has been subscribed. The Association of Commerce has petitioned the Council to authorize the Board of Public Works to proceed with the installation of the lamps.

KALAMAZOO, MICH.—Plans are being prepared by Stahl, Kinsey & Chapman, architects, 117 West Fort Street, Detroit, for a power plant for the Kalamazoo Normal School.

MIO, MICH.—Preparations are being made by the Eastern Michigan Pwr. Co. for the construction of a dam (the fourth) in Mio for the Commonwealth Pwr. Co.

MOUNT MORRIS, MICH.—The Village Council has adopted a resolution favoring the calling of an election to vote on the proposal to grant an electric-lighting franchise in Mount Morris.

PINCONNING, MICH.—The property and franchises of the Pinconning Lt. & Pwr. Co. have been purchased by J. J. Thorne, of Bay City. The new owner, it is understood, will make improvements to the plant, including the installation of new machinery and equipment. The flat-rate system will be abandoned and meters will be installed.

BLANCHESTER, OHIO.—A bond issue of $5,000 will soon be sold by the town of Blanchester to provide funds for the installation of a new electric-lighting system for the town.

CHESTER, OHIO.—The Council is considering the question of lighting the streets of the town with electricity. The East Liverpool Trac. & Lt. Co., of East Liverpool, furnishes electrical service in Chester.

CLEVELAND, OHIO.—A permit has been obtained by the Ursuline Sisters for the erection of a power plant, 57 ft. by 58 ft., for the convent buildings on the lake front in Nottingham, to cost about $8,000. E. J. Schneider is architect.

CLEVELAND, OHIO.—Bids will be received until Sept. 8 by the clerk of Board of Education of Cleveland for material and labor to complete a school building situated at the corner of Rawlins and Holton Avenues, including heating and ventilating and electrical work.

CLEVELAND, OHIO.—Bids will be received at the office of the clerk of Board of Education of Cleveland until Sept. 21 for material and labor necessary to complete the remodeling of the electric wiring at East High School. F. G. Hogan is director of schools.

COLLINWOOD, OHIO.—The Cleveland Seating Co., 550 Rose Building, Cleveland, has purchased a site in Collinwood for the purpose of establishing a new factory. The main building will be 400 ft. by 100 ft.; a power house will be erected and also a number of dry kilns. About $75,000 will be expended for the buildings. C. C. Stanley, of Chicago, Ill., is president.

DEFIANCE, OHIO.—The proceeds of the $666,000 bond issue allowed the Auglaize Pwr. Co., of Defiance, by the Ohio Public Utilities Commission will be used to take up outstanding indebtedness, purchase additional flowage lands for the hydroelectric plant, erect an auxiliary steam reserve plant, and the additions and extensions to transmission and distributing lines.

DE GRAFF, OHIO.—Plans are being considered for the construction of a new municipal electric-light plant, to replace the power plant recently destroyed by fire.

HURON, OHIO.—The Council is contemplating extending the commercial lighting system of the municipal electric plant to a district south of the river road.

LIMA, OHIO.—Bids will be received by the Lima State Hospital Commission until Sept. 11 for lighting fixtures in the new hospital and for certain electric wiring.

MARION, OHIO.—The City Council is considering extending the electric-lighting service in several parts of the city and erecting additional street lamps.

MIDDLEPORT, OHIO.—Application has been made by the Pomeroy & Middleport El. Co., of Pomeroy, for a franchise to furnish electricity in Middleport.

MIDDLETOWN, OHIO.—The installation of a municipal electric-light plant in connection with the proposed improvements at the water-works is under consideration.

MILLERSBURG, OHIO.—Bonds to the amount of $35,000, it is reported, have been voted for the installation of a municipal electric-light plant in Millersburg.

OTTOVILLE, OHIO.—Bonds to the amount of $3,000 have been issued to provide funds for the installation of an electric-lighting system.

STEUBENVILLE, OHIO.—H. D. Hershey, of Irvin, Pa., has submitted a proposal to the City Council offering to supply electricity in Steubenville. Mr. Hershey proposes to install a plant here.

URBANA, OHIO.—The Urbana Tel. Co. is preparing to place its wires and cables in underground conduits in the business district.

CAVE CITY, KY.—The Cave City Ice Co. is reported to be contemplating the installation of an electric-light plant in connection with its ice factory.

HENDERSON, KY.—Bids will soon be asked for the erection of a steel frame boiler room, 64 ft. by 90 ft., to replace the one recently destroyed by a cyclone. L. P. Hite is superintendent.

BREMEN, IND.—The Council, it is reported, is considering improvements to the municipal street-lighting service.

EAST GARY, IND.—The town of East Gary has engaged George F. Peterson, of Miller, Ind., electrical engineer, to take charge of the erection of a transmission line and distribution system in East Gary.

GARY, IND.—Application has been filed by attorneys representing Charles H. Maloney, Henry A. Vossler and Ingwald Moe, all of Gary, with the Public Service Commission for authority to acquire a new franchise from the city of Gary to establish a second electric plant here.

CHICAGO, ILL.—The Illinois Central R. R. Co. has appropriated $50,000 for the equipment of a telephone system of train dispatching between Clinton and Centralia.

CHICAGO, ILL.—The Commonwealth Edison Co. has acquired a title to 24 acres of land in South Chicago and plans are being prepared for a large electric power plant in the center of the large manufacturing district there. The plant will also supply electricity in Burnside.

EAST ST. LOUIS, ILL.—The East St. Louis Lt. & Pwr. Co. has submitted a proposal to the Prospect Park Improvement Association offering to furnish electrical service in Prospect Park subdivision.

ELGIN, ILL.—An injunction against the city of Elgin in regard to issuing bonds or accepting bids for machinery, etc., for municipal lighting plant has been affirmed by the appellate court. At this time the City Council has not decided whether to appeal to the Illinois Supreme Court or call a special referendum election. In any event no bonds for lighting plant will be issued during 1914. William F. Sylla is city clerk.

GALESBURG, ILL.—The City Council is considering an ordinance providing for a uniform standard for ornamental lamps. Plans are being considered by the Simmons Street merchants for the installation of an ornamental lighting system on that street.

JOLIET, ILL.—The installation of an electric-light plant in the high school in connection with the new heating and ventilating system is under consideration.

WAUKEGAN, ILL.—All bids submitted for the installation of an ornamental lighting system on Genesee and Washington Streets, it is reported, have been rejected by the committee.

ABLEMAN, WIS.—The installation of an electric-lighting system in Ableman is reported to be under consideration.

BLACK RIVER FALLS, WIS.—Within the next two months the city of Black River Falls expects to purchase 3000 ft. of armored steel cable and 20 No. 21,121 Cutter ornamental posts carrying five-lamp clusters. W. L. Jones is city clerk.

BOSCOBEL, WIS.—The electric light commissioners expect to purchase within the next 30 days one 25-hp, three-phase, 60-cycle motor. Charles A. Blair is general manager.

LADYSMITH, WIS.—Within the next three months the Ladysmith Ltg. Co. expects to purchase a 60-hp generating unit. H. W. True is manager.

MINERAL POINT, WIS.—Within the next 30 days the Mineral Point Pub. Ser. Co. expects to erect a 13,000-volt transmission line to Dodgeville, material for which has already been purchased. F. C. Ludden is president.

ORFORDVILLE, WIS.—The Village Council is considering an application for a franchise to install an electric-lighting system in Orfordville.

SUPERIOR, WIS.—The Wisconsin Railroad Commission has authorized the Superior Wtr., Lt. & Pwr. Co. to issue $100,000 in capital stock, the proceeds to be used for extensions and improvements to its system.

BIWABIK, MINN.—The Great Northern Pwr. Co., of Duluth, has been granted a franchise to furnish electricity in Biwabik. The company has also been awarded a contract to furnish electricity to operate the municipal electric plant.

DULUTH, MINN.—The City Commissioners have adopted a resolution to offer to purchase the property of the Duluth-Edison El. Co. on an appraisal by W. B. Rittenhouse and C. L. Pillsbury, which fixes the value at $907,940 and the going value at $200,000. If the company accepts the offer, the city agrees to take over the plant by Jan. 1, 1915. If the company refuses, the city may build a plant, or install a distributing system and purchase energy from the Great Northern Pwr. Co., or condemn the Duluth-Edison plant.

MANKATO, MINN.—The Village Council of North Mankato is considering the installation of a municipal electric light plant. Estimates will also be secured on the cost of a new pump and engine for pumping station.

ST. PAUL, MINN.—The contract for the construction of the power house at St. Catherine's Academy has been awarded to John Hoffman.

SOUTH STILLWATER, MINN.—The municipal electric-light plant in South Stillwater, it is reported, has been destroyed by fire, causing a loss of about $20,000.

AKRON, IA.—The installation of a municipal electric light plant in Akron is under consideration.

CEDAR RAPIDS, IA.—Plans and specifications are being considered by the City Council for the construction of a dam across the Cedar River, to cost about $125,000. The Iowa Ry. & Lt. Co. will pay its share of the cost of building the dam.

The company, having purchased the Union Hills and the Anchor Mills, owns five-sixty-fourths of the water-power and will pay that proportion of the cost. The exact location of the company's power house has not been determined, but it will probably be somewhere on the site of the Anchor Mills.

CHARTER OAK, IA.—At a special election held recently the proposal to issue bonds for the installation of a municipal electric-light plant in Charter Oak was carried.

CROTON, IA.—The installation of a street-lighting system in Croton is reported to be under consideration.

EARLHAM, IA.—Improvements involving an expenditure of $8,000, it is reported, are contemplated to the municipal electric-light and water plant.

FORT MADISON, IA.—A committee has been appointed by the Fort Madison Commercial Club to make investigations with a view of installing an ornamental street-lighting system. C. F. Tingwald is a member of the committee.

GRUNDY CENTER, IA.—The local electric-light plant, owned by J. B. Calderwood, it is reported, was recently destroyed by fire, causing a loss of about $10,000.

HARRIS, IA.—The Council is contemplating submitting to the voters a proposal to issue $7,000 in bonds for the installation of an electric-lighting system. Electricity to operate the system is to be obtained from the plant in Sibley.

SERGEANT BLUFF, IA.—Plans are being prepared for the installation of a municipal electric-light plant in Sergeant Bluff to cost about $10,000.

WESTBORO, MO.—The City Council has decided to install an electric-lighting system. Arrangements, it is reported, have been made with the Tarkio El. & Wtr. Co., of Tarkio, to furnish electricity to operate same.

BOWBELLS, N. D.—Soule Brothers, owners of the Kenmare Lt. & Pwr. Co., of Kenmare, it is reported, have been granted a franchise to install and operate an electric-lighting plant in Bowbells.

GRAND FORKS, N. D.—Plans have been accepted by the City Council for extension to the electric-lighting system in the district about the court house and Masonic Temple.

MANDAN, N. D.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Sept. 24 for construction, including mechanical equipment, interior lighting fixtures and approaches. of the United States post office at Mandan. Drawings and specifications may be obtained from the above office or from the custodian of site at Mandan. O. Wenderoth is supervising architect.

ERWIN, S. D.—The installation of an electric-lighting system is reported to be under consideration by the City Council.

LAKE PRESTON, S. D.—A franchise has been granted to E. G. Ostroot, president, for erection and maintenance of an electric. transmission line between Lake Preston and De Smet.

McINTOSH, S. D.—Bonds to the amount of $6,000, it is reported, have been voted for the installation of a municipal electric-light plant.

NORFOLK, NEB.—The City Council, it is reported, is negotiating with the Iowa-Nebraska Pub. Ser. Co., of Norfolk, for the installation of a new street-lighting system.

ST. PAUL, NEB.—Plans are being prepared for a municipal electric-light and power plant and for improvements to the pumping station. An election will soon be called to vote on the proposal to issue bonds for same. Harper & Stiles, Grand Avenue Temple, Kansas City, Mo., are consulting engineers.

VALENTINE, NEB.—Bonds to the amount of $5,000 have been voted for improvements to the water and light plant.

Southern States

GULFPORT, FLA.—The Bayview Hotel & Development Co., of Gulfport, it is reported, has awarded a contract for the installation of an electric-light plant to the Florida El. & Machine Co., of St. Petersburg. F. J. Davenport is manager of the Bayview company.

JACKSONVILLE, FLA.—The city is contemplating the installation of underground conduits for electric wires on Main Street, between Bay Street and Hogan's Creek, at a cost of about $20,000.

PABLO BEACH, FLA.—The City Council is reported to be considering the question of submitting the proposal to issue $10,000 in bonds to establish a municipal electric-light plant to the voters.

PUNTA GORDA, FLA.—The contract for the installation of a municipal electric-light plant has been awarded to P. E. Fansler, of St. Petersburg. The plant will have sufficient output to maintain about 1500 lamps. The electric plant and water-works will be operated by a 50-hp Diesel engine.

FRIENDSHIP, TENN.—The Business Men's League is promoting plans for the installation of an electric-light plant and water-works system here. W. C. Jones is secretary of the league.

NEWPORT, TENN.—At an election to be held Sept. 12 the proposal to issue $5,000 in bonds for the installation of a municipal electric-light plant will be submitted to the voters.

ANDALUSIA, ALA.—The property and franchises of the Andalusia Lt. & Wtr. Co. have been purchased by J. D. Anderson, O. L. Benson, G. O. Waits and J. L. Knox, for $65,000. The new owners, it is reported, contemplate improvements to the system.

MABEN, MISS.—The Board of Aldermen, it is reported, has awarded a franchise to F. H. Mudd to install and operate an electric-light plant in Maben.

ARGENTA, ARK.—Bonds have been voted, it is reported, for the installation of an ornamental street-lighting system on East Washington Street.

GLENWOOD, ARK.—John H. Pedan, of Hot Springs, recently granted a franchise to install an electric-light plant in Glenwood, will begin work immediately on installation of the proposed system.

GURDON, ARK.—Albert C. Moore, of Joplin, Mo., consulting engineer, has been engaged to prepare plans and supervise the construction of a municipal electric-light plant in Gurdon. As yet only preliminary reports have been made on the work.

KNOBEL, ARK.—The local electric-light plant, owned by G. A. Booser, is reported to have recently been destroyed by fire.

MARSHALL, ARK.—The Town Council has granted A. B. and V. B. Johnson, managers of the Marshall Milling Co., a franchise to install and operate an electric-light plant in Marshall for a period of 40 years.

ABITA SPRINGS, LA.—Messrs. Aubert & Rauch, of Abita Springs, recently awarded contract for street-lighting, has purchased equipment for its proposed plant, which includes one 2300-volt Fairbanks-Morse alternating-current generator, one 5-kva transformer, 80 pine poles and 20,000 ft. of wire for overhead distribution system. The street-lighting system consists of 18 60-watt lamps.

GUTHRIE, OKLA.—The proposal to issue from $250,000 to $500,000 in bonds to purchase the local electric-light plant was defeated at the election held Aug. 11.

McLOUD, OKLA.—The contract for the erection of a high-tension transmission line and electric distributing system in the town of McLoud has been awarded to the Mater El. Co., of Guthrie, at $6,070. The Benham Engineering Co., American National Bank Building, Oklahoma City, has charge of the engineering work for the town.

AMARILLO, TEX.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Sept. 28 for construction complete, including mechanical equipment, except elevator, lighting fixtures and approaches, of the United States post office and court house at Amarillo. Drawings and specifications may be obtained at the above office or from the custodian of site at Amarillo. O. Wenderoth is supervising architect.

BLUE RIDGE, TEX.—The Greenville & Whitewright Interurban Co., which has completed the construction of an electric railway between Anna and Blue Ridge, is preparing to extend the railway to either Whitewright or Greenville.

BRENHAM, TEX.—The construction of an interurban electric railway between Brenham and Independence is being promoted by S. D. W. Low and associates. A power station will be built in Brenham.

FLORESVILLE, TEX.—Plans are being considered, it is reported, by A. H. Poth for the installation of an electric-light plant in Floresville.

MARBLE FALLS, TEX.—An election will be held on Sept. 5 to submit the proposal to issue bonds for a water-power development on the Colorado River. The plans provide for the construction of a concrete dam 115 ft. long and 6 ft. high, a power house 20 ft. by 40 ft., and water-works system with capacity of 500,000 gal. The cost of the work is estimated at $45,000. As yet an engineer has not been employed.

McKINNEY, TEX.—The Texas Pwr. & Lt. Co., of Dallas, is reported to be contemplating enlarging its local electric-light plant.

Pacific States

CATHLAMET, WASH.—Plans are being considered by the City Council for the installation of a municipal electric-light plant. The General Electric Co. and the Pacific States Co., both of Portland, Ore., have been asked to submit estimates of cost of plant. A special election will be called to vote on a bond issue to provide funds for same as soon as estimates are submitted.

SEATTLE, WASH.—The city utilities committee of the City Council has recommended a bill appropriating $25,000 for the purchase of five automobile buses for the city car line, to be operated in connection with Division "A" and the Highland Park and Lake Burien line.

SEATTLE, WASH.—Within the next 12 months the city of Seattle expects to build an addition to the Cedar Falls generating station (to be equipped with a 10,000-kw generating unit) and an 8500-ft. penstock; also to purchase one 100,000-kw impulse wheel-driven generating unit (600 ft. head), with exciter, oil switches and auxiliary apparatus for the above unit; also to expend about $20,000 for distributing transformers. The city has recently closed a contract for meters, to cost $100,000, and for incandescent lamps, to cost $80,000. J. D. Ross is superintendent of lighting.

DRAIN, ORE.—A contract has been signed by the Mayor and city recorder whereby the Douglas County Lt. & Wtr. Co., Roseburg, will supply this city with electricity. The company proposes to extend its transmission line from Oakland to Drain at once. The city has engaged John W. Hogg, of Sutherlin, to take charge of the installation of the local distribution system. A street-lighting system will also be installed.

LOS ANGELES, CAL.—The City Council has passed the ordinance providing for the installation of ornamental lamps on Grand Avenue between Sixth and Main Streets, and on Figueroa Street between Sixth and Tenth Streets.

SAN DIEGO, CAL.—The San Diego Consol. Gas & El. Co. has closed a contract with the city of San Diego to furnish electricity to operate two 250-hp pumps for the city water-works reservoir, and also for ten 15-hp motors to pump water into the collecting reservoirs.

PLUMMER, IDAHO.—The Public Service Commission has granted Dunkle Brothers a certificate of public necessity to install and operate an electric-light plant in Plummer, work on which will soon begin.

DUNCAN, ARIZ.—A building in the Head addition, it is reported, has been purchased by J. E. Allen, one of the owners of the local electric light plant, and associates, in which a new electric-light plant will be installed in the near future.

LOVELAND, COL.—At a special taxpayers' election held Aug. 8 the proposal to establish a municipal electric-light plant, to cost $12,000, was carried. The Board of Aldermen was authorized to proceed with plans and to submit a proposition to issue bonds for same at the November election. It is proposed to erect a hydroelectric plant at Big Thompson River, 12 miles west of the city.

SANTA FE, N. M.—The Rio Grande Lt., Ht. & Pwr. Co., recently incorporated with a capital stock of $1,000,000, proposes to build a dam and hydroelectric power at White Rock Canyon on the Rio Grande River, about 40 miles above Albuquerque. Electricity generated at the plant will be transmitted to Albuquerque; Santa Fé and Las Vegas. The incorporators are Charles L. Wilfong, James Morrison and F. E. Wilson.

Canada

EDMONTON, ALTA.—Another power project has recently been submitted to the City Council by Sir John Jackson, consulting engineer. The plans provide for utilizing the water-power of Rocky Rapids on the Saskatchewan River, about 160 miles west of Edmonton. Three developments are proposed, which at low-water period would give, it is estimated, a minimum of 35,000 hp.

NEW DENVER, B. C.—The power plant of the New Denver Lt. & Pwr. Co., it is reported, was recently destroyed by fire. The plant, it is understood, will be rebuilt at once.

BERLIN, ONT.—The City Council is considering the installation of a lighting

system on King Street from Union on the north to the city limits on the south.

COMBER, ONT.—The by-law providing for an expenditure of $4,500 to secure electricity from the Hydro-Electric Commission of Ontario has been approved by the ratepayers.

MONTREAL, QUE.—The City Lighting Department, it is reported, will soon call for tenders for furnishing 200 ornamental lamp standards for St. Catherine and Bleury Streets, 113 of which will be erected this summer.

MONTREAL, QUE.—The Montreal Lt., Ht. & Pwr. Co. has recently awarded a contract to the Northern El. Co., of Montreal, for 80,000 ft. of 300,000 circ. mil, three-core, 13,200-volt, paper-insulated, lead-covered cable.

MONTREAL, QUE.—A special meeting of the stockholders of the Laurentide Co. has been called for Sept. 23 to vote on the proposal to issue $4,000,000 in bonds, the proceeds to be used in part for completion of the large hydroelectric development of the company at Grand Mère and the extension of the paper plant.

OUTREMONT, QUE.—The Northern El. Co., of Montreal, has been awarded a contract for 1500 nitrogen-filled lamps for street-lighting in Outremont; also for 23,000 ft. of lead-covered cable and 3000 ft. of armored cable. The contract for lamp standards was awarded to the William Hamilton Co., of Peterborough.

SHAWINIGAN FALLS, QUE.—The Belfo Canadian Pulp & Paper Co. is planning to install a 500-hp steam turbine, the slow speed shaft to run 250 r.p.m.

New Incorporations

COLUMBIA, ALA.—The Columbia Pwr. Co. has been incorporated with a capital stock of $16,000. The officers are: R. D. Crawford, of Dothan, president; Demont Shemwell, vice-president, and J. E. Foy, secretary and treasurer, both of Eufaula.

FLORENCE, ALA.—The Carolina Central El. Co. has been chartered with a capital stock of $5,000 by D. T. McKeithan, J. W. McCowan and George E. Dargan.

PORTLAND, MAINE.—The Royal River Mfg. & Pwr. Co. has been incorporated with a capital stock of $150,000 to furnish electrical and other power. The company, it is understood, will not furnish electricity for lighting purposes. The officers are: John Tannor, of New York, N. Y., president, and Phillip F. Nestal, of Cresskill, N. Y., treasurer.

GALVESTON, TEX.—The Lawrence El. Co. has filed articles of incorporation with a capital stock of $10,000. The incorporators are David Lawrence and others.

MONTREAL, QUE., CAN.—The Southern El. Lt. & Pwr. Co. has been incorporated with a capital stock of $500,000 and proposes to furnish electricity in the counties of Nicolet, Lotbinière, Arthabasca, Yamaska, Dummond, Richelieu and Megantic.

RAWDON, QUE., CAN.—The Montcalm El. Lt. & Pwr. Co. has been incorporated with a capital stock of $90,000 by J. T. R. Gazelle, Joseph Amedee Fournier and E. Rowan.

Weekly Record of Electrical Patents

UNITED STATES PATENTS ISSUED AUG. 18, 1914.

[Prepared by Robert Starr Allyn, 16 Exchange Place, New York, N. Y.]

1,106,729. WIRELESS-TELEGRAPH INSTALLATON FOR AERIAL VESSELS; L. Rouzet, Paris, France. App. filed April 21, 1913. Tension lode at starting point of antenna.

1,107,246. ELECTRIC SWITCH; F. Barr, New York, N. Y. App. filed Aug. 2, 1912. Pendent pull socket.

1,107,247. ELECTRIC SWITCH; F. Barr, New York, N. Y. App. filed March 11, 1913. Rotary snap with radial detent.

1,107,250. CONDUIT-WIRING DEVICE; N. J. Bingham, Detroit, Mich. App. filed April 26, 1912. Reel for fishing wire.

1,107,255. TELEPHONE TRANSMITTER; L. Bradley and H. L. Bradley, Muskegon, Mich. App. filed Dec. 26, 1908. Special resistor.

1,107,257. ELECTROLYTIC CELL; J. B. Burdett, Chicago, Ill. App. filed Oct. 29, 1912. For manufacturing oxygen and hydrogen.

1,107,258. ELECTROLYTIC CELL; J. B. Burdett, Chicago, Ill. App. filed Nov. 6, 1912. For decomposing water, etc.

1,107,259. ELECTROLYTIC CELL; J. B. Burdett, Chicago, Ill. App. filed Nov. 6, 1912. Separate collection of gases.

1,107,261. MUSIC GENERATOR AND MUSIC-DISTRIBUTING APPARATUS; T. Cahill, Washington, D. C. App. filed Aug. 10, 1895. Alternating-current system (142 claims).

1,107,281. INSULATOR; R. Friese, Charlottenburg, Germany. App. filed Jan. 7, 1911. Condenser action.

1,107,290. APPARATUS FOR METERING CONVERSATIONS IN AUTOMATIC TELEPHONE SYSTEMS; G. Grabe, Nikolassee, near Berlin, Germany. App. filed June 24, 1911. Measures after the conversation.

1,107,309. PROCESS FOR THE ELECTROLYSIS AND TREATMENT OF SULPHATE LIQUORS; E. J. Hunt, Oldbury, and W. T. Gidden, Warley, England. App. filed March 21, 1914. Porous diaphragm.

1,107,316. THERMOSTAT; F. Kuhn and F. E. Shailor, Detroit, Mich. App. filed Dec. 2, 1909. Friction lock.

1,107,318. ELECTRICAL PLUG CONNECTOR; F. Kuhn, Detroit, Mich. App. filed Oct. 5, 1912. Metal housing.

1,107,319. ELECTRICALLY HEATED RADIATOR; F. Kuhn, Detroit, Mich. App. filed March 25, 1913. Household heater.

1,107,320. ELECTRICAL HEATING UNIT; F. Kuhn, Detroit, Mich. App. filed Sept. 8, 1913. Armored type.

1,107,321. ELECTRICALLY HEATED HOT-PLATE; F. Kuhn, Detroit, Mich. App. filed Sept. 8, 1913. Mechanical construction.

1,107,322. ELECTRICAL HEATER; F. Kuhn, Detroit, Mich. App. filed Dec. 27, 1913. Foot warmer.

1,107,323. ELECTRIC HEATER; F. Kuhn and F. E. Shailor, Detroit, Mich. App. filed Feb. 6, 1914. Exposed resistor.

1,107,333. ELECTRIC HEATER; G. H. Mansfield and C. E. Wild, Canton, Ohio. App. filed April 22, 1914. Air circulation.

1,107,336. PRINTING TELEGRAPH; F. R. McBerty, New Rochelle, N. Y. App. filed May 31, 1912. Electromagnetic switching device; two wires with ground return.

1,107,365. PRINTING TELEGRAPH; C. E. Scribner, Jericho, Vt., and F. R. McBerty, New Rochelle, N. Y. App. filed March 6, 1911. Controlled by two successive direct-current impulses.

1,107,366. TELEGRAPH RECEIVER; C. E. Scribner, Jericho, Vt. App. filed Nov. 28, 1911. Electromagnetic selection.

1,107,367. TELEGRAPH RECEIVER; C. E. Scribner, Jericho, Vt. App. filed Nov. 28, 1911. Selective relay system.

1,107,371. TELEPHONE SYSTEM; C. A. Simpson, Chicago, Ill. App. filed Oct. 6, 1911. Combination, common battery and local battery.

1,107,381. ELECTRO-PNEUMATIC BRAKE; W. V. Turner, Edgewood, Pa. App. filed Nov. 25, 1913. Equalizing.

1,107,401. ELECTRIC COUPLING; C. H. Bissel, Syracuse, N. Y. App. filed July 25, 1910. Cable plant.

1,107,438. SELENIUM-CELL REGULATOR; M. Moskowitz, New York, N. Y. App. filed June 18, 1910. For lighting systems.

1,107,441. VULCANIZER; M. W. Olson, Galesburg, Ill. App. filed March 17, 1913. For dental work.

1,107,465. TROLLEY RETRIEVER; P. N. Van Epp, Medina, Ohio. App. filed Jan. 25, 1913. Spring-actuated drum.

1,107,478. ELECTRIC FURNACE AND METHOD OF OPERATING THE SAME; R. A. Bayard, Niagara Falls, N. Y. App. filed May 27, 1913. Resistance type.

1,107,495. ELECTRICALLY OPERATED MUSICAL INSTRUMENT; C. Coleman, Chicago, Ill. App. filed Aug. 22, 1898. Piano expression.

1,107,498. SPARK-PLUG TESTER AND TERMINAL; H. Dalitz, Seattle, Wash. App. filed April 14, 1913. External attachment.

1,107,499. JUNCTION BOX; C. W. Davis, Edgeworth, Pa. App. filed Aug. 27, 1910. For underground cables, etc.

1,107,536. RELAY; F. R. McBerty, New Rochelle, N. Y. App. filed Feb. 26, 1910. For telephone exchange.

1,107,552. BRAKING SYSTEM; W. Schaake, Pittsburgh, Pa. App. filed Oct. 8, 1910. Actual magnetic track brake.

1,107,555. CONTROL SYSTEM FOR ELECTRIC MOTORS; C. G. Tarkington, Chicago, Ill. App. filed May 9, 1911. Alternating-current hoist motor.

1,107,584. LIGHTNING ARRESTER; A. W. Burke, Wilkinsburg, Pa. App. filed March 11, 1912. Series loop.

1,107,610. ANNUNCIATOR DROP; W. W. Henry, Wollaston, Mass. App. filed Oct. 24, 1912. Prevents rebound.

1,107,618. STORAGE-BATTERY PLATE; M. Krokavetz, Cleveland, Ohio. App. filed April 6, 1914. Holding surface.

1,107,645. CIRCUIT CLOSER; B. Benedict, New York, N. Y. App. filed Sept. 30, 1913. For hand lamps.

1,107,645. ELECTRIC SWITCH; B. Benedict, New York, N. Y. App. filed Sept. 30, 1913. Pocket flashlight.

1,107,650. INCANDESCENT LAMP; A. W Beuttell, New York, N. Y. App. filed April 21, 1909. Filament support.

1,107,654. HORN; C. Carson, Detroit, Mich. App. filed May 12, 1913. Alternating-current noise device.

1,107,670. ELECTROMETRIC APPLIANCE; W. Jandus, Cleveland, Ohio. App. filed April 16, 1906. Expansion and contraction device.

1,107,767. BURGLAR ALARM; A. P. Dick, Jr., Clarksville, Tex. App. filed May 28, 1913. Portable device.

1,107,794. AUXILIARY SIGNAL DEVICE; R. Ireland, Edison, Ohio. App. filed March 28, 1913. Telephone extension bell.

1,107,814. ELECTRIC DRYING APPARATUS; W. K. Mason, Cambridge, Mass. App. filed April 28, 1914. Comb.

1,107,861. REFILLABLE FUSE; C. N. Stout, Hamilton, Ont., Can. App. filed Jan. 19, 1914. Cartridge type.

1,107,914. APPARATUS FOR GOVERNING THE SPEED OF MOTORS; W. W. Dean, Chicago, Ill. App. filed Oct. 19, 1903. Direct-current type.

1,107,932. MEANS FOR PREVENTING SPARKING IN ELECTRICAL DEVICES; L. Grubman, New York, N. Y. App. filed April 16, 1912. Reversible field core.

1,107,945. FIRE AND BURGLAR ALARM; H. Hesse, Easton, Pa. App. filed April 18, 1914. Household type.

1,107,951. INCANDESCENT-LAMP SOCKET; H. Hubbell, Bridgeport, Conn. App. filed May 31, 1912. Shell interlocked.

1,108,025. SNAKE PULLER; F. A. Thies, New York, N. Y. App. filed July 26, 1913. Conduit fishing.

1,108,028. SYSTEM OF ELECTRICAL SELECTION; N. L. Tolstad, Groton, S. D. App. filed Oct. 20, 1906. For telephone work, etc.

1,108,036. REAR SIGNAL FOR VEHICLES; M. F. Walsh, New York, N. Y. App. filed Nov. 21, 1912. Direction signals.

1,108,050. COMPOUND TRANSFORMER; W. J. Williams, Albany, N. Y. App. filed Dec. 21, 1909. Voltage regulation.

1,108,052. SIGNAL DEVICE FOR AUTOMOBILES; A. Winton and H. B. Anderson, Cleveland, Ohio. App. filed July 8, 1913. Operated through steering column.

1,108,062. VOTIVE-OFFERING STAND; G. B. Bohne, West Hoboken, N. J. App. filed Nov. 6, 1913. Alarm device.

1,108,084. BLOCK SYSTEM FOR TRAMWAYS; D. D. Samia, Milan, Italy. App. filed Sept. 29, 1911. Single track.

1,108,086. DYNAMO; E. M. Tormin, Newton Center, Mass. App. filed March 3, 1911. For automobile use, etc.

1,108,087. DYNAMO; E. M. Tormin, Newton Center, Mass. App. filed Jan. 27, 1912. Direct-current lighting.

1,108,088. CENTRIFUGAL SWITCH; E. M. Tormin, Newton Center, Mass. App. filed Jan. 27, 1912. For motor-vehicle lighting system.

1,108,109. TELEGRAPH SYSTEM; A. H. Adams, Sparkill, N. Y., and A. F. Dixon, Newark, N. J. App. filed Feb. 16, 1912. Mechanical printing control.